Chemical Engineering Catalog

Collected Condensed and
Standardized Catalogs of

Chemical Engineering Equipment Machinery Chemicals and Supplies

1916
EDITION

The CHEMICAL CATALOG CO. *Inc.*
ONE MADISON AVENUE
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The CHEMICAL CATALOG CO., *Inc.*
ONE MADISON AVENUE :: :: :: NEW YORK

Chemical Engineering Catalog

Collected, Condensed and
Standardized Catalogs of

Chemical Engineering Equipment, Machinery, Chemicals and Supplies

Cross-Indexed for Ready Reference

1916
EDITION

The CHEMICAL CATALOG COMPANY, *Inc.*
ONE MADISON AVENUE
(Formerly 437 Fifth Avenue)
NEW YORK

E. M.

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What the Chemical Engineering Catalog Is

The Chemical Engineering Catalog is a book of reference for Chemical Engineers, Buyers and others seeking information on Chemical and Metallurgical Equipment, Machinery, Chemicals and Supplies.

More specifically, it is a collection of catalogs and other data relating to the above mentioned subjects, condensed and standardized as to page size and typographical arrangement, bound in one volume for convenient and ready reference. It is a Chemical Engineer's shelf-full of miscellaneous catalogs condensed into a single book.

It is indexed and cross-indexed in such a way that one may quickly be directed to any specific information it contains.

It is published annually under the supervision of a Committee appointed by The American Institute of Chemical Engineers, The American Chemical Society and The Society of Chemical Industry.

A copy of the Chemical Engineering Catalog will be loaned, without charge, for a period of one year, to any Chemical Engineer, Research Chemist, Industrial Plant Superintendent, Works Manager, Buyer, Firm or Individual who has legitimate use for such a reference work. On the issuance of a new catalog, the old one will be recalled and the new one substituted in its place.

For additional information, see pages immediately following.

Eight Thousand and Five Hundred copies of this edition (1916) have been printed and placed in carefully selected hands

The Chemical Catalog Company, Inc.
One Madison Avenue
(Formerly 437 Fifth Avenue)
New York

An Appreciation

In publishing this edition of the Chemical Engineering Catalog, we are indebted to the following gentlemen, constituting a Committee appointed by The American Institute of Chemical Engineers, The American Chemical Society and the Society of Chemical Industry to supervise the compilation and to formulate the specifications and standards of our work, and we take this opportunity to thank them for the great assistance they have given us:

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A communication from the three Societies represented by this Committee, stating the reasons for this work, and the facts leading up to its publication, will be found on the following page.

The Chemical Catalog Co., Inc.

Errors and Omissions

Every effort has been made to make this book accurate and inclusive, particularly as to its Classified Index. But completeness and perfection seldom spring full-fledged from a first effort and this *first edition* is probably no exception to the general rule. An urgent demand for its early publication, owing to conditions prevailing in the Chemical Industries, combined with the usual difficulties of starting any new enterprise, are offered in partial explanation for errors of omission, or for lack of completeness, that the volume may reveal.

While on the subject of errors and omissions, however, we take the opportunity to suggest the need of co-operation on the part of the profession.

No work of this kind can ever be complete or entirely correct without criticisms, suggestions and a certain amount of assistance from users of the volume. And inasmuch as it is distributed gratuitously, for the convenience of those who have the greatest need for such a work, it is hoped that its recipients will realize the necessity of co-operation to the extent of making the volume larger, more complete and, therefore, more valuable as a reference work.

For instance, when an engineer fails to find the products of any particular firms mentioned in the Catalog pages or in the index, when he fails to find the technical data he desires regarding goods that are mentioned, or when he finds products interesting to the engineer omitted entirely, he is urged to write to the manufacturer or to us (better to both), calling attention to the omission, its inconvenience to him and consequent loss or delay of *business* to the manufacturer and suggesting the importance of remedying the omission next year.

By so doing, Chemical Engineers will perform a service for *themselves*, for us and for the manufacturer. The more comprehensive the information contained in this book the more useful it will be to the Engineer and the greater the *net saving to manufacturers* by elimination of misdirected and misapplied distribution of very expensive catalogs, most of which are mislaid and many of which go straight into the waste basket.

We shall appreciate co-operation of this kind, as well as any suggestion or criticism intended for the better service of all.

THE CHEMICAL CATALOG CO., INC.

Our Free Information Bureau

If you do not find in this volume the information you are looking for, we suggest that you communicate with our Free Information Bureau. This Bureau is maintained especially for the convenience of those desiring catalog data that is particularly hard to obtain, and, also to take care of any important omissions from the Catalog. It is in charge of a Chemical Engineer of several years' experience who has access to the immense amount of carefully indexed data that we have collected and compiled in the course of preparing this Catalog.

We want to emphasize the fact that we regard the service of our Information Bureau as supplementary to the Catalog, and, like the Catalog, for the *free* use of any person seeking information on Chemical Apparatus, Machinery, Power Equipment, Chemicals and Supplies.

We welcome inquiries (which will be kept strictly confidential when so requested) and the opportunity to be of service to those whom we have elected to serve in this capacity. Nothing in the way of catalog information will ever be too much bother for us to handle cheerfully and to the best of our ability.

We hope you will rapidly come to depend on us and our Catalog for the Information that has hitherto been so inconveniently and so effectively concealed in the shelves full of miscellaneous catalogs and pamphlets reposing in Chemical Engineers' offices.

Kindly address your inquiries to the

INFORMATION BUREAU
The Chemical Catalog Co., Inc.
ONE MADISON AVENUE, NEW YORK

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The page numbers refer purely to the contents of the book. Where no page numbers are given firms have not taken catalog space, but have merely listed their names under a number of the products they make. The completeness of this information is necessarily limited by the data given us by the firms. Nothing is included in this index but information supplied us by the firms whose names appear herein.

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- Contact Process Co., Buffalo, N. Y.
- Globe Chemical Co., Cincinnati, Ohio.
- Harrison Bros. & Co., Inc., Philadelphia, Pa.
- Kalbfleisch, Franklin H. Co., New York, N. Y.
- Mallinckrodt Chemical Works, St. Louis, Mo.
- Naugatuck Chemical Co., Naugatuck, Conn.
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Contact Process Co., Buffalo, N. Y.
Ducktown Sulphur, Copper & Iron Co., Ltd., Isabella, Tenn.
Globe Chemical Co., Cincinnati, Ohio.
Harrison Bros. & Co., Inc., Philadelphia, Pa.
International Agricultural Corporation, New York, N. Y.
Jarecki Chemical Co., Cincinnati, Ohio.
Kalbfleisch, Franklin H. Co., New York, N. Y.
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Naugatuck Chemical Co., Naugatuck, Conn.
New Jersey Zinc Co., New York, N. Y.
Orleans Chemical Co., New Orleans, La.
Pennsylvania Salt Manuf'g. Co., Philadelphia, Pa.
Richmond Guano Co., Richmond, Va.
Riverside Acid Works, Warren, Pa.
Southern States Phosphate & Fertilizer Co., Augusta, Ga.
Virginia-Carolina Chemical Co., Richmond, Va.
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Ammonium Vanadate
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Taylor Instrument Companies, Rochester, N. Y.
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- Beckers, W., Aniline & Chemical Wks. Inc., Brooklyn, N. Y.
- Central Dyestuff & Chemical Co., Newark, N. J.
- Chemical Importing & Mfg. Co., New York, N. Y.
- Heller & Merz Co., New York, N. Y.
- Independent Chemical Co., New York, N. Y.
- National Aniline & Chemical Co., New York, N. Y.
- Seydel Mfg. Co., Jersey City, N. J.
- Weiller Mfg. Co., New Brunswick, N. J.

Aniline Dye Plants
- BADGER, E. B., & SONS CO., Boston, Mass. 102–109
- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125

Aniline Oil
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- MERCK & CO., New York, N. Y. 222
- Chemical Importing & Mfg. Co., New York, N. Y.
- Dow Chemical Co., Midland, Mich.
- Edison, Thomas A., Orange, N. J.
- Independent Chemical Co., New York, N. Y.
- Industrial Chemical Co., Providence, R. I.
- Midvale Chemical Works, Elizabeth, N. J.
- Naugatuck Chemical Co., Naugatuck, Conn.
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- MERCK & CO., New York, N. Y. 222
- Benzol Products Co., Marcus Hook, Pa.
- Chemical Company of America, Inc., New York, N. Y.
- Edison, Thomas A., Orange, N. J.
- Independent Chemical Co., New York, N. Y.
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Anodes, All Metals
- Hanson & Van Winkle Co., Newark, N. J.
- International Acheson Graphite Co., Niagara Falls, N. Y.

Anodes, Gold
- BAKER & CO., Inc., Newark, N. J. 100
- Platt, Charles S. Co., New York, N. Y.

Anodes, Nickel
- Zucker, Levett, Loeb Co., New York, N. Y.

Anodes, Platinum
- BAKER & CO., Inc., Newark, N. J. 100
- BISHOP, J. & CO. PLATINUM WORKS, Malvern, Pa. 114

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- Platt, Charles S., Co., New York, N. Y.

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- BARRETT CO., New York, N. Y. 101
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- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
- Chemical Importing & Mfg. Co., New York, N. Y.
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Antimony Chloride Solution
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Antimony Regulus
- FOOTE MINERAL CO. INC., Philadelphia, Pa. 161

Antimony Oxide
- FOOTE MINERAL CO., Inc., Philadelphia, Pa. 161
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Antimony-Potassium Tartrate
- SQUIBB, E. R. & SONS, New York, N. Y. . . 253

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- MERCK & CO., New York, N. Y. 222
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Antimony Sulphide
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- Atlas Chemical Co., Waltham, Mass.

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- R. Bardewyck, New York, N. Y.
- Naugatuck Chemical Co., Naugatuck, Conn.

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- HEYDEN CHEMICAL WORKS, The, New York, N. Y. 186

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- Linde Air Products Co., New York, N. Y.

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- American Smelting & Refining Co., New York, N. Y.
- Drakenfeld, B. F. & Co. Inc., New York, N. Y.
- Mallinckrodt Chemical Works, St. Louis, Mo.
- Pfaltz & Bauer, Inc., New York, N. Y.

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Arsenic, Sulphide
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Arsenious Oxide
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- ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240
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- Johns-Manville, H. W., Co., New York, N. Y.
- Keasbey & Mattison, Ambler, Pa.

Asbestos Boiler & Pipe Covering
- American Asbestos Co., Norristown, Pa.
- Philip Carey & Co., Lockland, O.
- Johns-Manville, H. W., Co., New York, N. Y.
- Keasbey & Mattison, Ambler, Pa.

Asbestos Cement
- Philip Carey Mfg. Co., Lockland, O.
- Johns-Manville, H. W., Co., New York, N. Y.
- Keasbey & Mattison, Ambler, Pa.

Asbestos Clothing
- American Asbestos Co., Norristown, Pa.
- Johns-Manville, H. W., Co., New York, N. Y.

Asbestos Filter Cloth
- Johns-Manville, H. W., Co., New York, N. Y.

Asbestos Gloves
- Johns-Manville, H. W., Co., New York, N. Y.

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Virginia-Carolina Chemical Co., Richmond, Va.
Union Card & Paper Co., New York, N. Y.
Bakelite Coil Impregnation
General Bakelite Co., New York, N. Y.
Bakelite Moulded Insulation
General Bakelite Co., New York, N. Y.
Bakelite Protective Enamel
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Barrels, Tumbling
Hanson & Van Winkle Co., Newark, N. J.

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Michel Cooperage Co., Sandusky, Ohio.
New York Cooperage Co., Brooklyn, N. Y.

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Belting, Round
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Castner Electrolytic Alkali Co., Niagara Falls, N. Y.
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Champion Blower and Forge Co., Lancester, Penna.
Clarage Fan Co., Kalamazoo, Mich.
Connersville Blower Co., Connersville, Ind.
Crowell Mfg. Co., Brooklyn, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Garden City Fan Co., Chicago, Ill.
Improved Appliance Co,, Brooklyn, N. Y.
Piqua Blower Co., Piqua, Ohio
Roots, P. H. & F. M., Co., Connersville, Ind.
Sturtevant, B. F., Co., Hyde Park, Mass.
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Blowers, Foot
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Piqua Blower Co., Piqua, Ohio

Blowers, Hand
Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Roots, P. H. & F. M., Co., Connersville, Ind.

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Improved Appliance Co., Brooklyn, N. Y.
Garden City Fan Co., Chicago, Ill.
Piqua Blower Co., Piqua, Ohio.
Roots, P. H. & F. M., Co., Connersville, Ind.
Scott, C. U., Davenport, Iowa.
Sturtevant, B. F., Co., Hyde Park, Mass.
Timmis & Clissold, Bound Brook, N. J.
Wilbraham-Green Blower Co., Pottstown, Pa.
Wing, L. J., Mfg. Co., New York, N. Y.

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Bicalky Fan Co,, Buffalo, N. Y.
Sturtevant, B. F., Co., Hyde Park, Mass.

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Boilers, Internally Fired
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- Chemical Importing & Mfg. Co., New York, N. Y.
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- PACIFIC COAST BORAX CO., New York, N. Y. 231

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- PACIFIC COAST BORAX CO., New York, N. Y. 231
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

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- PACIFIC COAST BORAX CO., New York, N. Y. 231
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

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- Randolph-Clowes Co., Waterbury, Conn.

Brass Couplings
- Gutta Percha & Rubber Mfg. Co., New York, N. Y.

Brass, Perforated
- American Perforated Metal Co., Belleville, N. J.
- Harrington & King Perforating Co., Chicago, Ill.

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- Evens & Howard Fire Brick Co., St. Louis, Mo.
- Harbison-Walker Refractories Co., Pittsburgh, Pa.
- Hocking Valley Fire Clay Co., Nelsonville, Ohio
- Mack Mfg. Co., Philadelphia, Pa.
- Rieha, Edward L., Baltimore, Md.
- U. S. Stoneware Co., Akron, Ohio

Brick, Bauxite
- Harbison-Walker Refractories Co., Pittsburgh, Pa.
- Laclede Christy Clay Products Co., St. Louis, Mo.

Brick, Chrome
- Harbison-Walker Refractories Co., Pittsburgh, Pa.

Brick, Fire Clay
- HOOD, B. MIFFLIN, BRICK CO., Atlanta, Ga. 188-189
- Bickford Fire Brick Co., Curwensville, Pa.
- Denny-Renton Clay & Coal Co., Seattle, Wash.
- Evens & Howard Fire Brick Co., St. Louis, Mo.
- Federal Clay Product Co., Mineral City, Ohio
- Gardner, James, Jr., Co., Bolivar, Pa.
- Garfield Fire Clay Co., Robinson, Pa.
- Harbison-Walker Refractories Co., Pittsburgh, Pa.
- Laclede Christy Clay Products Co., St. Louis, Mo.
- Maurer, Henry, & Son, New York, N. Y.
- Ohio Fire Brick Co., Oak Hill, Ohio
- Remmey, Richard C., Son Co., Philadelphia, Pa.

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Brick, Salt Glazed, Acid
- Hocking Valley Fire Clay Co., Nelsonville, Ohio

Brick, Salt Glazed, Acid, Floor
- Hocking Valley Fire Clay Co., Nelsonville, Ohio

Brick, Sand
- Garfield Fire Clay Co., Robinson, Pa.

Brick, Silica
- Harbison-Walker Refractories Co., Pittsburgh, Pa.

Brick, Vitrified
- Denny-Renton Clay & Coal Co., Seattle, Wash.
- Mack Mfg. Co., Philadelphia, Pa.
- Maurer, Henry, & Son, New York, N. Y.

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- MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221

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Brushes, Test Tube
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Gruendler Patent Crusher & Pulverizer Co., St. Louis, Mo.

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Gutta Percha & Rubber Mfg. Co., New York, N. Y.

Buckets, Clam Shell
Lakewood Engineering Co., Cleveland, Ohio

Buckets, Dump
EASTON CAR & CONSTRUCTION CO., Easton, Pa. 152
Lakewood Engineering Co., Cleveland, Ohio

Buckets, Elevator
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Zucker, Levett, Loeb Co., New York, N. Y.

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EIMER & AMEND, New York, N. Y. . . . 154–155
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Buffalo Dental Mfg. Co., Buffalo, N. Y.
Improved Appliance Co., Brooklyn, N. Y.
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SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
Gefeorer, C., & Son, Inc., Philadelphia, Pa.
Improved Appliance Co., Brooklyn, N. Y.
Oven Equipment & Mfg. Co., New Haven, Conn.
Quigley Furnace & Foundry Co., Springfield, Mass.
Tate, Jones & Co., Inc., Pittsburgh, Pa.

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Improved Appliance Co., Brooklyn, N. Y.
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- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
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- Deloro Mining & Reduction Co., Ltd., Deloro, Ont.
- Metals-Chemical, Ltd., Welland, Ont.
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- SQUIBB, E. R., & SONS, New York, N. Y. . 253

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- Edison, Thomas A., Orange, N. J.

Cobalt, Nitrate
- SQUIBB, E. R., & SONS, New York, N. Y. 253
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Cobalt Oleates
- Fales, W. H., Co., New York, N. Y.

Cobalt, Oxides
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Cobalt Salts
- MERCK & CO., New York, N. Y. 222
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
- Deloro Mining & Reduction Co., Ltd., Deloro, Ont.
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.
- Edison, Thomas A., Orange, N. J.
- Metals-Chemical, Ltd., Welland, Ont.

Cobalt Tungstate
- Fales, W. H., Co., New York, N. Y.

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- MERCK & CO., New York, N. Y. 222
- ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240

Cocks, Acid Proof, Sulphuric & Mixed Acids only
- M H-Aterite Co., Inc., New York, N. Y.

Cocks, Monel Metal
- Wm. Powell Co., The, Cincinnati, Ohio

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- DURIRON CASTINGS CO., New York, N. Y. 146–149

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- Eastwood Wire Mfg. Co., Belleville, N. J.

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- Kensington Copper & Machine Works, Philadelphia, Pa.
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- Kensington Copper & Machine Works, Philadelphia, Pa.
- Providence Coppersmithing Co., Providence, R. I.
- Whitlock Coil Pipe Co., West Hartford, Conn.

Coils, Iron
- Whitlock Coil Pipe Co., West Hartford, Conn.

Coils, Platinum
- BAKER & CO., Inc., Newark, N. Y. 100
- BISHOP, J., & CO. PLATINUM WORKS, Malvern, Pa. 114
- American Platinum Works, Newark, N. J.

Coils, Steel
- Whitlock Coil Pipe Co., West Hartford, Conn.

Coils, Stoneware
- GERMAN AMERICAN STONEWARE Works, New York, N. Y. 176–179
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- CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
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- Precision Instrument Co., Detroit, Mich.

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- COOPER, CHAS., & CO., New York, N. Y. . 132
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- BAKER & CO., Inc., Newark, N. J. 100
- BISHOP, J., & CO. PLATINUM WORKS, Malvern, Pa. 114
- GUERNSEY EARTHENWARE CO., Cambridge, Ohio 180–181
- LABORATORY SUPPLY CO., Columbus, Ohio 209
- Buffalo Dental Mfg. Co., Buffalo, N. Y.
- Norton Co., Worcester, Mass.

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- Oakley Chemical Co., New York, N. Y.

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- Park Chemical Co., Detroit, Mich.

Compounds, Grinding
- Oakley Chemical Co., New York, N. Y.

Compounds, Molding
- Redmanol Chemical Products Co., Chicago, Ill.

Compounds, Plasterers' Cleaning
- Oakley Chemical Co., New York, N. Y.

Compounds, Preservative
- MOGUL CO., New York, N. Y. 223
- TOCH BROTHERS, New York, N. Y. . . . 267

Compounds, Screw Cutting
- Oakley Chemical Co., New York, N. Y.

Compounds, Tanning
- Bulls Ferry Chemical Co., Hudson Heights, N. J.
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- MOGUL CO., New York, N. Y. 223
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- EIMER & AMEND, New York, N. Y. . . . 154–155
- OLIVER CONTINUOUS FILTER CO., San Francisco, Cal. 230
- PALO CO., New York, N. Y. 232
- SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
- UNION STEAM PUMP CO., Battle Creek, Mich. 272–273
- Bishop-Babcock-Becker Co., Cleveland, O.
- Blaisdell Machinery Co., Bradford, Pa.
- Crowell Mfg. Co., Brooklyn, N. Y.
- Gardner Governor Co., Quincy, Ill.
- Hooven, Owens, Rentschler Co., Hamilton, Ohio
- Ingersoll-Rand Co., New York, N. Y.
- May-Nelson Mfg. Co., Washington, D. C.
- Nash Engineering Co., South Norwalk, Conn.
- National Transit Pump & Machine Co., Oil City, Pa.
- Norwalk Iron Works Co., South Norwalk, Conn.
- Pelton & Crane Co., Detroit, Mich.
- Rumsey & Co., Ltd., Seneca Falls, N. Y.

Compressors, Ammonia
- DE LA VERGNE MACHINE CO., New York, N. Y. 150

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- AMERICAN STEAM PUMP CO., Battle Creek, Mich. 95
- UNION STEAM PUMP CO., Battle Creek, Mich. 272–273
- National Transit Pump & Machine Co., Oil City, Pa.
- Hooven, Owens, Rentschler Co., Hamilton, Ohio
- Ingersoll-Rand Co., New York, N. Y.
- International Oxygen Co., New York, N. Y.
- Norwalk Iron Works Co., South Norwalk, Conn.

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- DURIRON CASTINGS CO., New York, N. Y. 146–149
- GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179
- KALBPERRY CORPORATION, New York, N. Y. 201
- THERMAL SYNDICATE, Ltd., New York, N. Y. 262–263
- Pratt Engineering & Machine Co., Atlanta, Ga.

Concentrators, Alcohol, Crude
- LUMMUS, WALTER E. CO., Boston, Mass. 214–219

Concentrators, Ammonia
- Western Gas Construction Co., Ft. Wayne, Ind.

Concentrators, Phosphoric Acid
- CHEMICAL CONSTRUCTION CO., Charlotte, N. C. 130

Concentrators, Sulphuric Acid
- CHEMICAL CONSTRUCTION CO., Charlotte, N. C. 130
- GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179
- KALBPERRY CORPORATION, New York, N. Y. 201
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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Gas Machinery Co., Cleveland, Ohio
Hamilton Copper & Brass Works, Hamilton, Ohio
National Transit Pump & Machine Co., Oil City, Pa.
Pioneer Iron Works, Brooklyn, N. Y.
Struthers Wells Co., Warren, Pa.
Whinery, S. B., New York, N. Y.
Whitlock Coil Pipe Co., West Hartford, Conn.

Condensers, Barometric
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
Wheeler, C. H., Manufacturing Co., Philadelphia, Pa.
Worthington Pump & Machinery Corporation, New York, N. Y.

Condensers, Copper
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
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Claussen, J. H., Copper Works, Inc., Brooklyn, N. Y.
The American Copper & Brass Works, Cincinnati, Ohio

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BARTLETT HAYWARD CO., The, Baltimore, Md. 110
Stacey Manufacturing Co., Cincinnati, Ohio
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BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125

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BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
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Cones, Concentrating
Merrill Metallurgical Co., San Francisco, Cal.

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BISHOP, J., & CO. PLATINUM WORKS, Malvern, Pa. 114
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Cones, Filter, Platinum
BAKER & CO., Inc., Newark, N. J. 100
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Contacts—Graphite
International Acheson Graphite Co., Niagara Falls, N. Y.

Contacts, Iridium
BISHOP, J., & CO. PLATINUM WORKS, Malvern, Pa. 114

Contacts, Platinum
BAKER & CO., Inc., Newark, N. J. 100
BISHOP, J., & CO. PLATINUM WORKS, Malvern, Pa. 114

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Bishop-Babcock-Becker Co., Cleveland, O.
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Carrier Engineering Co., New York, N. Y.

Controllers, Oil
Geissinger Regulator Co., New York, N. Y.

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Controllers, Tank Water
Watts Regulator Co., Lawrence, Mass.

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Nason Manufacturing Co., New York, N. Y.
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Conveying Weigher Co., New York, N. Y.
Gruendler Patent Crusher & Pulverizer Co., St. Louis, Mo.
Jeffrey Manufacturing Co., Columbus, Ohio.
Kennedy-Stroh Corp., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland, Ohio.

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LINK-BELT CO., Chicago, Ill. 212

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LINK-BELT CO., Chicago, Ill. 212
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Kutztown Foundry & Machine Co., Philadelphia, Pa.
Lehigh Car, Wheel & Axle Works, Catasauqua, Pa.
Nordyke & Marmon Co., Indianapolis, Ind.
O'Brien, A. P., Richmond, Va.
Patterson Foundry & Machine Co., East Liverpool, Ohio
Philadelphia Textile Machinery Co., Philadelphia, Pa.
Ruggles-Coles Engineering Co., New York, N. Y.
Stokes, F. J., Machine Co., Philadelphia, Pa.
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Hersey Mfg. Co., So. Boston, Mass.
Manitowoc Engineering Works, Manitowoc, Wis.
Reeves Bros. Co., Alliance, Ohio
Whiting Foundry Equipment Co., Harvey, Ill.
Dryers, Shelf
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Dryers, Vacuum Drum
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
DEVINE, J. P., CO., Buffalo, N. Y. 138–141
Dryers, Vacuum Rotary
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
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BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
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American Synthetic Color Co., Stamford, Conn.
American Synthetic Dyes Co., New York, N. Y.
Arnold, Hoffman & Co., New York, N. Y.
Bayer Co., The (Albany Aniline & Chemical Co.), New York, N. Y.
Beckers Aniline & Chemical Works, Inc., Brooklyn, N. Y.
Calco Chemical Co., Bound Brook, N. J.
Central Dyestuff & Chemical Co., Newark, N. J.
Chicago Color and Chemical Co., Chicago, Ill.
Dominion Iron & Steel Co., Sydney, N. S., Canada
Dow Chemical Co., Midland, Mich.
Dupont Chemical Co., Wilmington, Del.
Federal Dyestuff & Chemical Co., Kingsport, Tenn.
Franco-Swiss Colours Co., New York, N. Y.
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Jamaica Dyewood & Chemical Co., New York, N. Y.
Klipstein, A., & Co., New York, N. Y.
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National Aniline & Chemical Co., New York, N. Y.
National Synthetic Co., Perth Amboy, N. J.
Neidich Process Co., Bellville, N. J.
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Obex Laboratories Co., Marietta, Ohio
Schoelkopf Aniline & Chemical Works, Buffalo, N. Y.
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Stamford Mfg. Co., Stamford, Conn.
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- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
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- JANTZ & LEIST ELECTRIC CO., Cincinnati, Ohio 200
- PALO CO., New York, N. Y. 232
- Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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- GENERAL ELECTRIC CO., Schenectady, N. Y. 166–170
- JANTZ & LEIST ELECTRIC CO., Cincinnati, Ohio 200
- Canadian Hanson & Van Winkle Co., West Toronto, Canada
- Crocker-Wheeler Co., Ampere, N. J.
- Hanson & Van Winkle Co., Newark, N. J.
- Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
- Zucker, Levett, Loeb Co., New York, N. Y.

Earth, Fullers
- Salomon, L. A., & Bro., New York, N. Y.

Earth, Infusorial
- Salomon, L. A., & Bro., New York, N. Y.

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- Salomon, L. A., & Bro., New York, N. Y.

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- ELECTRIC HEATING APPARATUS CO., New York, N. Y. 156–157

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- BISHOP, J., & CO. PLATINUM WORKS, Malvern, Pa. 114
- PALO CO., New York, N. Y. 232
- International Acheson Graphite Co., Niagara Falls, N. Y.
- National Carbon Co., Cleveland, Ohio

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- Hanson & Van Winkle Co., Newark, N. J.

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- Dixie Electro Magnet Co., Memphis, Tenn.

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- ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240
- Hanson & Van Winkle Co., Newark, N. J.

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- LINK-BELT CO., Chicago, Ill. 212
- MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221
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- WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281
- American Tool & Machine Co., Boston, Mass.
- Chain Belt Co., Milwaukee, Wis.
- Conveying Weigher Co., New York, N. Y.
- Jeffrey Mfg. Co., Columbus, Ohio
- Kaestner & Hecht Co., Chicago, Ill.
- Kennedy-Stroh Corp., Pittsburgh, Pa.
- Stephens-Adamson Mfg. Co., Aurora, Ill.

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- Whiting Foundry Equipment Co., Harvey, Ill.

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- DAY, J. H., CO., The, Cincinnati, Ohio 135
- PROCESS ENGINEERS LIMITED, Montreal, Que. 237
- Riley, B., Hauk Supply Co., St. Louis, Mo.

Emulsifier, Erfurt (Patented)
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- American Bitumastic Enamels Co., New York City.
- General Bakelite Co., New York, N. Y.
- Trus-Con Laboratories, Detroit, Mich.

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- CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
- CHEMICAL CONSTRUCTION CO., Charlotte, N. C. 130
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- LINK-BELT CO., Chicago, Ill. 212
- MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221
- Guarantee Construction Co., New York, N. Y.
- Moses, Pope & Messer, New York, N. Y.
- Westinghouse, Church, Kerr & Co., New York, N. Y.

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- CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
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- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
- CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
- CHEMICAL CONSTRUCTION CO., Charlotte, N. C. 130
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- IMPROVED EQUIPMENT CO., New York, N. Y. 196

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- Hooven, Owens, Rentschler Co., Hamilton, Ohio

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- Hooven, Owens, Rentschler Co., Hamilton, Ohio
- Murray Iron Works Co., Burlington, Iowa

Engines, Gas
- Hooven, Owens, Rentschler Co., Hamilton, Ohio
- DuBois Iron Works, DuBois, Penna.
- Fairbanks Co., New York, N. Y.
- National Transit Pump & Machine Co., Oil City, Pa.
- Otto Gas Engine Works, Philadelphia, Pa.

Engines, Gasoline
- DuBois Iron Works, DuBois, Penna.
- Otto Gas Engine Works, Philadelphia, Pa.
- Ottumwa-Moline Engine & Pump Co., Ottumwa, Iowa

Engines, Jordan
- McKim Foundry & Machine Co., Lockport, N. Y.
- Noble & Wood Mch. Co., Hoosick Falls, N. Y.

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- DE LA VERGNE MACHINE CO., New York, N. Y. 150
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- Bay City Iron Co., Bay City, Mich.
- Goldie & McCulloch Co., Ltd., Galt, Ont.
- Hooven, Owens, Rentschler Co., Hamilton, Ohio
- Ridgway Dynamo & Engine Co., Ridgway, Pa.
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- Mallinckrodt Chemical Works, St. Louis, Mo.

Ether, Sulphuric
- Du Pont Chemical Works, Wilmington, Del.

Ethyl Acetate
- Anderson Chemical Co., Passaic, N. J.
- Du Pont Chemical Works, Wilmington, Del.

Ethyl Butyrate
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Ethyl Chloride
- COOPER, CHAS., & CO., New York, N. Y. 132
- Franco American Chemical Works, Inc., Carlstadt, N. J.

Ethyl Formate
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Ethyl Iodide
- Hoffman & Kropff Chemical Co., Brooklyn, N. Y.

Ethyl Valerate
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- ABBÉ ENGINEERING CO., New York, N. Y. 90–93

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- GERDES & CO., Inc., New York, N. Y. 174
- KESTNER EVAPORATOR CO., Philadelphia, Pa. 204
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- MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221
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- Kleinschmiett, F., & Co., Buffalo, N. Y.
- Oat, Joseph, & Sons, Philadelphia, Pa.
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Fibre Board, Perforated
Harrington & King Perforating Co., Chicago, Ill.
Filling Machines, Bag
Nordyke & Marmon Co., Indianapolis, Ind.
Payne & Joubert Machine & Foundry Co., Birmingham, Ala.
Filling Machines, Can
Automatic Weighing Machine Co., Newark, N. J.
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Kalbfleisch, Franklin H., Co., New York, N. Y.
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Mallinckrodt Chemical Works, St. Louis, Mo.
Mercury Salts
COOPER, CHAS., & CO., New York, N. Y. 132
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POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
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Mesothorium
PALO CO., New York, N. Y. 232
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Carbolineum Wood Preserving Co., Milwaukee, Wis.
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Wall, H. T., Co., Providence, R. I.
Metals, Perforated
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Meta-nitraniline Plants
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
Meta-phenylenediamine Plants
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
Meta-toluylenediamine Plants
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
Meters, Ampere-hour
Electric Weighing Co., New York, N. Y.
Meters, Acid-resisting
Worthington Pump & Machinery Corporation, New York, N. Y.
Meters, Boiler Feed
Worthington Pump & Machinery Corporation, New York, N. Y.
Meters, Electric
Duncan Electric Mfg. Co., Lafayette, Ind.
Queen Gray Co., Philadelphia, Pa.
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FOXBORO CO., Inc., The, Foxboro, Mass. 162–163
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Meters, Gas
Pittsburgh Meter Co., East Pittsburgh, Pa.
Platt, Charles S., Co., New York, N. Y.
Sprague Meter Co., Bridgeport, Conn.
Meters, Gas and Air
Bailey Meter Co., Boston, Mass.
Meters, Oil
Bowser, S. F., & Co., Inc., Ft. Wayne, Ind.
National Meter Co., New York, N. Y.
National Supply Co., Chicago, Ill.
Worthington, Henry R., New York, N. Y.
Meters, Recording Liquid
National Meter Co., New York, N. Y.
Yarnall-Waring Co., Philadelphia, Pa.
Meters, Steam
James G. Biddle, Philadelphia, Pa.
Meters, Water
Alberger Pump & Condenser Co., New York City
Bailey Meter Co., Boston, Mass.
James G. Biddle, Philadelphia, Pa.
Booth, L. M., Co., Jersey City, N. J.
Hoppes Mfg. Co., Springfield, Ohio
National Meter Co., New York, N. Y.
Neptune Meter Co., New York, N. Y.
Pittsburgh Meter Co., East Pittsburgh, Pa.
Worthington, Henry R., New York, N. Y.
Meters, Water, Orifice Type
Bailey Meter Co., Boston, Mass.
Meters, Weir
Bailey Meter Co., Boston, Mass.
Methyl Alcohol Apparatus
Hoffman-Ahlers Co., Inc., Cincinnati, Ohio
Methyl Iodide
Hoffman & Kropff Chemical Co., Brooklyn, N. Y.
Methyl Orange
MERCK & CO., New York, N. Y. 222
Methyl Red
MERCK & CO., New York, N. Y. 222
Methyl Salicylate
BARRETT CO., New York, N. Y. 101
HEYDEN CHEMICAL WORKS, The, New York, N. Y. 186
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HERMAN & HERMAN, Inc., New York, N. Y. 185
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CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
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Asbestos & Mineral Corporation, New York, N. Y.
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NATIONAL GUM & MICA CO., New York, N. Y. 227
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BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. 111
DAIGGER, A., & CO., Chicago, Ill. 134
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GAERTNER, WM., & CO., Chicago, Ill. 165
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PALO CO., New York, N. Y. 232
SCHAAR & CO., Chicago, Ill. 244
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264
Leitz, Earnst, New York, N. Y.
Sargent, E. H., & Co., Chicago, Ill.
Spencer Lens Co., Buffalo, N. Y.
Williams, Brown & Earle, Inc., Philadelphia, Pa.
Microtomes
BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. 111
EIMER & AMEND, New York, N. Y. 154–155
SCHAAR & CO., Chicago, Ill. 244
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264
Spencer Lens Co., Buffalo, N. Y.
Millivoltmeters
THWING INSTRUMENT CO., Philadelphia, Pa. 265
Mill Strapping
Graton & Knight Mfg. Co., Worcester, Mass.

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ABBÉ ENGINEERING CO., New York, N. Y. 90–93
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RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill. 239
STROUD, E. H., & CO., Chicago, Ill. . . . 259
STURTEVANT MILL CO., Boston, Mass. . 254–255
Blymyer Iron Works, Cincinnati, O.
Campbell, P. F., Philadelphia, Pa.
Houchin-Aiken Co., Inc., Brooklyn, N. Y.
Ross, Charles, & Son Co., Brooklyn, N. Y.
Wilson Bros., Easton, Pa.

Mills, Air Separation. See Pulverizers, Air Separation

Mills, Assay
ABBE, PAUL O., New York, N. Y. 86–89

Mills, Attrition
ABBE, PAUL O., New York, N. Y. 86–89

Mills, Ball
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93
EIMER & AMEND, New York, N. Y. . . . 154–155
PALO CO., New York, N. Y. 232
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
Chalmers & Williams, Chicago Heights, Ill.
Colorado Iron Works Co., Denver, Colo.

Mills, Bone
Gruendler Patent Crusher & Pulverizer Co., St. Louis, Mo.
Sackett, A. J., Baltimore, Md.
Walker & Elliott, Inc., Wilmington, Del.
Wilson Bros., Easton, Pa.

Mills, Buhr Stone
Nordyke & Marmon Co., Indianapolis, Ind.
Orville Simpson Co., Cincinnati, Ohio
Walker & Elliott, Inc., Wilmington, Del.

Mills, Cage
ABBE, PAUL O., New York, N. Y. 86–89

Mills, Chaser
Ross, Charles, & Son Co., Brooklyn, N. Y.
Wilson Bros., Easton, Pa.

Mills, Chilian
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chalmers & Williams, Chicago, Ill.
Colorado Iron Works Co., Denver, Colo.
Hallidie Co., Spokane, Wash.
Power & Mining Machinery Co., Cudahy, Wis.

Mills, Color
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Drug
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Hance Bros. & White, Inc., Philadelphia, Pa.
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Dyestuff
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Emery
STURTEVANT MILL CO., Boston, Mass. . 254–255

Mills, Flour
STROUD, E. H., & CO., Chicago, Ill. . . . 259

Mills, Grease
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Gun Powder
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Hammer
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93

Mills, Jar
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93

Mills, Laboratory
ABBE, PAUL O., New York, N. Y. . . . 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93

Mills, Ore Sampling Drug and Chemical
STROUD, E. H., & CO., Chicago, Ill. . . . 259

Mills, Paint
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Paper
Roots, P. H. & F. M., Co., Connersville, Ind.

Mills, Paste
DAY, J. H., CO., Cincinnati, Ohio . . . 135
STROUD, E. H., & CO., Chicago, Ill. . . . 259

Mills, Pebble
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ABBE, PAUL O., New York, N. Y. 86–89
Bonnot Co., Canton, Ohio

Mills, Pebble—Continued
Colorado Iron Works Co., Denver, Colo.
Patterson Foundry & Machine Co., East Liverpool, Ohio

Mills, Plaster
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Pulp
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Pulverizing
RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill. 239
STROUD, E. H., & CO., Chicago, Ill. . . . 259
Lehigh Car, Wheel & Axle Works, Catasauqua, Pa.
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Roller
RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill. 239
STURTEVANT MILL CO., Boston, Mass. . 254–255
Ross, Charles, & Son Co., Brooklyn, N. Y.
Smythe, S. R., Co., Pittsburgh, Pa.

Mills, Screen Separation. See Pulverizers, Screen Separation

Mills, Stamp
Hallidie Co., Spokane, Wash.

Mills, Starch
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mills, Tube
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93
Chalmers & Williams, Chicago Heights, Ill.
Patterson Foundry & Machine Co., East Liverpool, Ohio

Mineralogy, Apparatus for
EIMER & AMEND, New York, N. Y. . . . 154–155
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264

Minerals, Rare
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Mittens, Safety
Graton & Knight Mfg. Co., Worcester, Mass.

Mixers
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93
BADGER, E. B., & SONS CO., Boston, Mass 102–109
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
DAY, J. H., & CO., Cincinnati, Ohio 135
DUNNING, W. D., Syracuse, N. Y. 151
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GEDGE-GRAY CO., Lockland, Ohio . . 171
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
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Campbell, P. F., Philadelphia, Pa.
Codd, E. J., Co., Baltimore, Md.
Gruendler Patent Crusher & Pulverizer Co., St. Louis, Mo.
Houchin-Aiken Co., Inc., Brooklyn, N. Y.
Karl Kiefer Machine Co., Cincinnati, Ohio
Ransome Concrete Machinery Co., Dunellen, N. J.
Read Machinery Co., Inc., York, Pa.
Werner, J., & Sons, Inc., Rochester, N. Y.

Mixers, Baking Powder
ABBE, PAUL O., New York, N. Y. 86–89
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KOVEN, L. O., & BRO., Jersey City, N. J. . 205
Ross, Charles, & Son Co., Brooklyn, N. Y.

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GEDGE-GRAY CO., Lockland, Ohio . . . 171

Mixers, Clay
GEDGE-GRAY CO., Lockland, Ohio . . . 171

Mixers, Color
GEDGE-GRAY CO., Lockland, Ohio . . . 171
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mixers, Compounds
ABBE, PAUL O., New York, N. Y. 86–89

Mixers, Concrete
Chain Belt Co., Milwaukee, Wis.
Lakewood Engineering Co., Cleveland, Ohio
Milwaukee Concerete Mixer Co., Milwaukee, Wis.

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Mixers, Dough
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WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281

Mixers, Dry
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Milwaukee Concrete Mixer Co., Milwaukee, Wis.
Walker & Elliott, Inc., Wilmington, Del.

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DUNNING, W. D., Syracuse, N. Y. 151
STURTEVANT MILL CO., Boston, Mass. 254–255
Ross, Charles, & Son Co., Brooklyn, N. Y.

Mixers, Glass Enameled
ELYRIA ENAMELED PRODUCTS CO., The, Elyria, Ohio 159

Mixers, Grease
ABBE, PAUL O., New York, N. Y. 86–89

Mixers, Lime
DUNNING, W. D., Syracuse, N. Y. 151
GEDGE-GRAY CO., Lockland, Ohio 171

Mixers, Liquid
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
DAY, J. H., CO., The, Cincinnati, Ohio 135
GEDGE-GRAY CO., Lockland, Ohio 171
WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281
Stokes, F. J., Machine Co., Philadelphia, Pa.

Mixers, Mass
ABBE, PAUL O., New York, N. Y. 86–89
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
DAY, J. H., CO., The, Cincinnati, Ohio 135
GEDGE-GRAY CO., Lockland, Ohio 171

Mixers, Paste
ABBE, PAUL O., New York, N. Y. 86–89
DAY, J. H., CO., The, Cincinnati, Ohio 135

Mixers, Steam Jacketed
SOWERS MFG. CO., Buffalo, N. Y. 248–251

Mixers, Vacuum
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
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Molds, Asphalt Flow
HOWARD & MORSE, New York, N. Y. 190–191

Molds, Briquette
HOWARD & MORSE, New York, N. Y. 190–191

Molds, Graphite
International Acheson Graphite Co., Niagara Falls, N. Y.

Molds, Rubber
Williams Foundry & Machine Co., Akron, Ohio

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Molybdate of Lead. See Lead Molybdate

Molybdenite
FOOTE MINERAL CO., Inc., Philadelphia, Pa. 161
Atkins, Kroll & Co., San Francisco, Cal.

Molybdenite Concentrating Plants
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
Turner, F. M., Jr., New York, N. Y.

Molybdenite, Electrostatic Separators for
HUFF ELECTROSTATIC SEPARATOR CO., Boston, Mass. 192

Molybdenum Metal
Primos Chemical Co., Primos, Pa.

Molybdenum Sulphide
FOOTE MINERAL CO., Inc., Philadelphia, Pa. 161

Monazite Sands, Electrostatic Separators for
HUFF ELECTROSTATIC SEPARATOR CO., Boston, Mass. 192

Monel Metal
DRIVER-HARRIS WIRE CO., Harrison, N. J. 144–145
Supplee-Biddle Hardware Co., Philadelphia, Pa.

Monel Sheets
Supplee-Biddle Hardware Co., Philadelphia, Pa.

Montejus, Acid
KNIGHT, MAURICE A., East Akron, Ohio 206–207

Mordants
Durfee, Winthrop C., Boston, Mass.

Morphine
MERCK & CO., New York, N. Y. 222

Morphine Sulphate
POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
Thomson, J. M., & Co., New York, N. Y.

Mortars
GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179

Mortars and Pestles
PALO CO., New York, N. Y. 232
Canton Glass Co., Marion, Ind.

Motor-generators
GENERAL ELECTRIC CO., Schenectady, N. Y. 166–170
JANTZ & LEIST ELECTRIC CO., Cincinnati, Ohio 200
Ridgway Dynamo & Engine Co., Ridgway, Pa.

Motor Generators, Low Voltage
GENERAL ELECTRIC CO., Schenectady, N. Y. 160–170
JANTZ & LEIST ELECTRIC CO, Cincinnati, Ohio 200

Motors, Electric
GENERAL ELECTRIC CO., Schenectady, N. Y. 166–170
JANTZ & LEIST ELECTRIC CO., Cincinnati, Ohio 200
PALO CO., New York, N. Y. 232
Geissinger Regulator Co, New York, N. Y.
Roth Bros & Co., Chicago, Ill.
Triumph Electric & Ice Machine Co., Cincinnati, Ohio
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Motors, Fan
GENERAL ELECTRIC CO., Schenectady, N. Y. 166–170
HOWARD & MORSE, New York, N. Y. 190–191
Duncan Electric Manufacturing Co., Lafayette, Ind.

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BAKER & CO., Inc., Newark, N. J. 100
BISHOP, J. & CO., PLATINUM WORKS, Malvern, Pa. 114
CARBORUNDUM CO., Niagara Falls, N. Y. 128
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International Acheson Graphite Co., Niagara Falls, N. Y.
Gardiner, James, Jr., Co., Bolivar, Pa.
Norton Co., Worcester, Mass.

Muffles, Clay
Buffalo Dental Manufacturing Co., Buffalo, N. Y.

Muffles, Platinum
BAKER & CO., Inc., Newark, N. J.
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Muffles, Silfrax
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BARRETT CO., New York, N. Y. 101
MERCK & CO., New York, N. Y. 222
Bayway Chemical Co., Elizabeth, N. J.
Edison, Thomas A., Orange, N. J.
Tennessee Coal, Iron & Rr. Co., Birmingham, Ala.
United Gas Improvement Co., Philadelphia, Pa.

Naphthalene
BARRETT CO., New York, N. Y. 101
ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240
Cabot, Samuel, Inc., Boston, Mass.
Edison, Thomas A., Orange, N. J.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
United Gas Improvement Co., Philadelphia, Pa.
Wiarda, John C., & Co., Brooklyn, N. Y.

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Naphthalene, Plants
- DEVINE, J. P., CO., Buffalo, N. Y. 138–141
- Western Gas Construction Co., Ft. Wayne, Ind.

Nephelometer
- AMERICAN APPARATUS CORPORATION, New York, N. Y. 211

"Nichrome"
- DRIVER-HARRIS WIRE CO., Harrison, N. J. 144–145

Nickel
- COOPER, CHAS., & CO., New York, N. Y. . 132
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Nickel and Nickel Alloy
- DRIVER-HARRIS WIRE CO., Harrison, N. J. 144–145

Nickel-Ammonium Sulphate
- SQUIBB, E. R., & SONS, New York, N. Y. . 253

Nickel, Carbonate
- LENZ & NAUMANN, Inc., New York, N. Y. 211
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Nickel, Chloride
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Nickel Hydroxide
- Edison, Thomas A., Orange, N. J.

Nickel, Nitrate
- SQUIBB, E. R., & SONS, New York, N. Y. . 253
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Nickel, Oxides
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.

Nickel, Salts
- COOPER, CHAS., & CO., New York, N. Y. . 132
- MERCK & CO., New York, N. Y. 222
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
- Deloro Mining & Reduction Co., Deloro, Ont.

Nickel, Sulphate
- SQUIBB, E. R., & SONS, New York, N. Y. . 253
- Drakenfeld, B. F., & Co., Inc., New York, N. Y.
- Edison, Thomas A., Orange, N. J.

Nigrosine
- HERMAN & HERMAN, Inc., New York, N. Y. 185
- NATIONAL GUM & MICA CO., New York, N. Y. 227
- Weiller Mfg. Co., New Brunswick, N. J.

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- BADGER, E. B., & SONS CO., Boston, Mass. 102–109
- BETHLEHEM FOUNDRY & MACHINE CO., South Bethlehem, Pa. 113
- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
- DEVINE, J. P., CO., Buffalo, N. Y. 138–141
- LUMMUS, WALTER E., CO., Boston, Mass. 214–219
- Farrar & Trefts, Inc., Buffalo, N. Y.

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Nitrating Kettles. See Kettles

Nitrating Pots. See Pots

Nitrating Stills. See Stills

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- GENERAL CHEMICAL CO., New York, N. Y. 172
- Butterworth-Judson Co., New York, N. Y.
- Globe Chemical Co., Cincinnati, Ohio
- Kalbfleisch, Franklin H., Co., New York, N. Y.
- Orleans Chemical Co., New Orleans, La.

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- MOORE, SAMUEL L., & SONS CORPORATION, Elizabeth, N. J. 224

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Nitrobenzol
- HERMAN & HERMAN, Inc., New York, N. Y. 185
- Benzol Products Co., Marcus Hook, Pa.
- Chemical Co. of America, Inc., New York, N. Y.
- Edison, Thomas A., Orange, N. J.
- Industrial Chemical Co., Providence, R. I.

Nitrobenzol Plants
- BADGER, E. B., & SONS CO., Boston, Mass. 102–109
- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
- DEVINE, J. P., CO., Buffalo, N. Y. 138–141
- MOORE, SAMUEL L., & SONS CORPORATION, Elizabeth, N. J. 224

Nitro Cellulose Apparatus
- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
- DEVINE, J. P., CO., Buffalo, N. Y. 138–141
- MOORE, SAMUEL L., & SONS CORPORATION, Elizabeth, N. J. 224

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- Linde Air Products Co., New York, N. Y.

Nitrogen Determination Apparatus
- EIMER & AMEND, New York, N. Y. . . . 154–155
- SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
- THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264

Nitrogen Equipment
- DAIGGER, A., & CO., Chicago, Ill. 134

Nitrogen Gas
- American Oxygen Co., Philadelphia, Pa.

Nitrometers
- AMERICAN APPARATUS CORPORATION, New York, N. Y. 211
- EIMER & AMEND, New York, N. Y. . . . 154–155
- LENZ & NAUMANN, Inc., New York, N. Y. 211
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Nitronaphthalin
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Nitrotoluol Plants
- BADGER, E. B., & SONS CO., Boston, Mass. 102–109
- BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
- DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Nitrous Oxide
- Lennox Chemical Co., Cleveland, Ohio
- Ohio Chemical and Mfg. Co., Cleveland, Ohio

"Nonex"
- CORNING GLASS WORKS, Corning, N. Y. 133

Nozzle, Blast Furnace
- Roots, P. H. & F. M., Co., Connersville, Ind.

Nozzles, "Duriron"
- DURIRON CASTINGS CO., New York, N. Y. 146–149

Nozzles, Sewage
- Cornell, W. G., Co., New York, N. Y.

Nozzles, Spray
- BUFFALO FORGE CO., Buffalo, N .Y. . . 116
- CARRIER AIR CONDITIONING CO. OF AMERICA, New York, N. Y. 129
- American Spray Co., Boston, Mass.

Nozzles, Spray, Platinum
- BISHOP, J., & CO., PLATINUM WORKS, Malvern, Pa. 114

Ochre Machinery
- Patterson Fdr'y & Mach. Co., East Liverpool, Ohio

Oil Burning Appliances. See Burners, Oil

Oil, Chinawood
- Swan & Finch Co., New York, N. Y.

Oil, Cocoanut
- Swan & Finch Co., New York, N. Y.
- Winkler, Isaac, & Bro., Cincinnati, Ohio

Oil Controls. See Controllers, Oil

Oil, Corn
- Celina Stearic Acid Co., Celina, Ohio
- Woolner & Co., Peoria, Ill.

Oil, Creosote
- BARRETT CO., New York, N. Y. 101
- United Gas Improvement Co., Philadelphia, Pa.

Oil, Dead
- United Gas Improvement Co., Philadelphia, Pa.

Oil, Dip
- BARRETT CO., The, New York, N. Y. . . . 101

Oil Eliminators
- Hoppes Mfg. Co., Springfield, Ohio

Oil, Essential
- Gazzolo Drug & Chemical Co., Chicago, Ill.
- Klipstein, A., & Co., New York, N. Y.
- Rockhill & Victor, New York, N. Y.

Oil Filtering Systems
- Bowser, S. F., & Co., Inc., Ft. Wayne, Ind.

Oil, Flotation
- American Turpentine & Tar Co., Ltd., New Orleans, La.
- General Naval Stores Co., New York, N. Y.
- Pensacola Tar & Turpentine Co., Gulf Point, Fla.
- Spirittene Chemical Co., Wilmington, N. C.
- Teeple, John E., New York, N. Y.

Oil, Fusel
- POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
- Anderson Chemical Co., Passaic, N. J.
- Dow Chemical Co., Midland, Mich.
- DuPont Chemical Works, Wilmington, Del.

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Oil, Fusel, Refined
DuPont Chemical Works, Wilmington, Del.
Franco American Chemical Works, Inc., Carlstadt, N. J.

Oil, Heavy Solvent
BARRETT CO., New York, N. Y. 101

Oil, Hydrocarbon, Neutral
BARRETT CO., New York, N. Y. 101

Oil, Lard
Swift & Co., Chicago, Ill.

Oil, Lubricating
Swan & Finch Co., New York, N. Y.
Waverly Oil Works Co., Pittsburgh, Pa.

Oil, Menhaden Fish
Swan & Finch Co., New York, N. Y.

Oil Mill Machinery
Buckeye Iron & Brass Works, Dayton, Ohio

Oil, Mixed, Softening
Bulls Ferry Chemical Co., Hudson Heights, N. J.

Oil of Myrbane
Benzol Products Co., Marcus Hook, Pa.
Brewer & Co., Worcester, Mass.

Oil, Oleo
Swift & Co., Chicago, Ill.

Oil, Olive
Swan & Finch Co., New York, N. Y.

Oil, Palm
Swan & Finch Co., New York, N. Y.

Oil, Solluble
Harding & Fancourt, Inc., Philadelphia, Pa.
Fergusson Brothers, Philadelphia, Pa.

Oil, Red
Celina Stearic Acid Co., Celina, Ohio

Oil, Soya Bean
Celina Stearic Acid Co., Celina, Ohio
Swan & Finch Co., New York, N. Y.

Oil, Sulphonated
Bulls Ferry Chemical Co., Hudson Heights, N. J.

Oil, Tallow
Swift & Co., Chicago, Ill.

Oil of Vitriol. See also Sulphuric Acid
Kalbfleisch, Franklin H., Co., New York, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Oil Savers and Waste Cleaner
Oakley Chemical Co., New York, N. Y.

Oil, Wood
East Jordan Chemical Co., East Jordan, Mich.

Oleite
William Andrews, Inc., New York, N. Y.

Oleum
GENERAL CHEMICAL CO., New York, N. Y. 172
GRASSELLI CHEMICAL CO., Cleveland, Ohio 182
HERMAN & HERMAN, Inc., New York, N. Y. 185
Contact Process Co., Buffalo, N. Y.
Harrison Bros. & Co., Inc., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Optical Glasses
BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. 111
CORNING GLASS WORKS, Corning, N. Y. 133

Optical Instruments
BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. 111
EIMER & AMEND, New York, N. Y. . . 154–155
GAERTNER, WM., & CO., Chicago, Ill. . 165
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245

Orange, HH
HERMAN & HERMAN, Inc., New York, N. Y. 185

Orange Mineral
Picher Lead Co., Joplin, Mo.

Ores, Rare
EIMER & AMEND, New York, N. Y. . . . 154–155
PALO CO., New York, N. Y. 232
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245

Ore Roasting Plants
KALBPERRY CORPORATION, New York, N. Y. 201

Orsats
EIMER & AMEND, New York, N. Y. . . . 154–155
PALO CO., New York, N. Y. 232
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
Precision Instrument Co., Detroit, Mich.

Orthoanisidine
Weiller Mfg. Co., New Brunswick, N. J.

Orthocresol
BARRETT CO., New York, N. Y. 101
NATIONAL GUM & MICA CO., New York, N. Y. 227

Osmium
BAKER & CO., Inc., Newark, N. J. 100

Ovens
EIMER & AMEND, New York, N. Y. . . . 154–155
MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264
WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281

Ovens, Bread
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281

Ovens, Charcoal, By-Product
LUMMUS, WALTER E., CO., Boston, Mass. 214–219

Ovens, Coke
Gas Machinery Co., Cleveland, Ohio
H. Koppers Co., Pittsburgh, Pa.
Wellman-Seaver-Morgan Co., Cleveland, Ohio

Ovens, Coke, By-Product
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
H. Koppers Co., Pittsburgh, Pa.

Ovens, Coke, By-Products Apparatus
Western Gas Construction Co., Ft. Wayne, Ind.
H. Koppers Co., Pittsburgh, Pa.

Ovens, Core
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
Whiting Foundry Equipment Co., Harvey, Ill.

Ovens, Drying
EIMER & AMEND, New York, N. Y. . . . 154–155
WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281
William Boekel & Co., Philadelphia, Pa.
Meek Oven Co., Newburyport, Mass.
Steiner, E. E., & Co., Newark, N. J.
Wahmann, George H., Mfg. Co., Baltimore, Md.

Ovens, Electric
EIMER & AMEND, New York, N. Y. . . 154–155
ELECTRIC HEATING APPARATUS CO., New York, N. Y. 156–157

Ovens, Enameling
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
WERNER & PFLEIDERER CO., Inc., Saginaw, Mich. 277–281

Ovens, Gas
Koppers, H., Co., Pittsburgh, Pa.

Ovens, Nitre
Caroline Foundry Co., Baltimore, Md.

Ovens, Proofing
KOVEN, L. O., & BRO., Jersey City, N. J. . 205

Ovens, Sectional
Oven Equipment & Mfg. Co., New Haven, Conn.

Oxone
ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240

Oxy-Acetylene
Burdett Mfg. Co., Chicago, Ill.

Oxy-Acetylene, Cutting and Welding Apparatus
Prest-O-Lite Co., Inc., Indianapolis, Ind.

Oxygen
PALO CO., New York, N. Y. 232
Burdett Mfg. Co., Chicago, Ill.
American Oxygen Co., Philadelphia, Pa.
International Oxygen Co., New York, N. Y.
Lennox Chemical Co., Cleveland, Ohio
Linde Air Products Co., New York, N. Y.
Ohio Chemical & Mfg. Co., Cleveland, Ohio
Swift & Co., Chicago, Ill.

Oxygen, In Cylinders
National Ox-Hydric Co., Chicago, Ill.

Oxygen Products
ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240

Oxygen, Pure, for Cutting & Welding
Superior Oxygen Co. of N. Y., New York, N. Y.

Ozokerite
Salomon, L. A., & Bro., New York, N. Y.

Packers, Barrel
Ross, Charles, & Son Co., Brooklyn, N. Y.

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Packers, Package
ABBE, PAUL O., New York, N. Y. 86–89

Packing House Machinery
American By-Product Machinery Co., New York City
Perrin, William R., & Co., Chicago, Ill.

Packing, Hydraulic
HYDRAULIC PRESS MFG. CO., Mt. Gilead, Ohio 193–195

Packing Material
CHEMICAL CONSTRUCTION CO., Charlotte, N. C. 130
Johns-Manville, H. W., Co., New York, N. Y.

Packing, Rubber
GOODRICH, B. F., CO., The, Akron, Ohio . 175
Acme Rubber Mfg. Co., Trenton, N. J.
Boston Belting Co., Boston, Mass.
Gutta Percha & Rubber Mfg. Co., New York, N. Y.
Manhattan Rubber Mfg. Co., Passaic, N. J.
Mechanical Rubber Co., Cleveland, Ohio
New York Belting & Packing Co., New York, N. Y.
Voorhees Rubber Mfg. Co., Jersey City, N. J.

Packing, Tower
GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179
HOOD, B. MIFFLIN, BRICK CO., Atlanta, Ga. 188–189
KNIGHT, MAURICE A., East Akron, Ohio . 206–207
Rieha, Edward L., Baltimore, Md.

Paint Machinery
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
Kaestner & Hecht Co., Chicago, Ill.

Paint Pigment
International Acheson Graphite Co., Niagara Falls, N. Y.

Paints, Acid Proof
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Cheesman & Elliot, New York, N. Y.
Detroit Graphite Co., Detroit, Mich.
Gutta Percha & Rubber Mfg. Co., New York, N. Y.

Paints, Anti-Corrosive
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Highland Chemical Products Co., Connellsville, Pa.

Paints, Anti-Cyanide
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Detroit Graphite Co., Detroit, Mich.

Paints, Chemical and Electrolytic
TOCH BROTHERS, New York, N. Y. . . . 267

Paints, Fume-Proof
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267

Paints, Heat-Resisting
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Cheesman & Elliot, New York, N. Y.

Paints, Insulating, Cold Storage
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267

Paints, Insulating, Electrical
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267

Paints, Metal Preservative
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Atlas Paint Co., New York, N. Y.
Clinton Metallic Paint Co., Clinton, N. Y.
Cheesman & Elliot, New York, N. Y.

Paints, Technical
TOCH BROTHERS, New York, N. Y. . . . 267

Paints, Waterproofing
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Samuel Cabot, Inc., Boston, Mass.
Cheesman & Elliot, New York, N. Y.
Hampden Paint & Chemical Co., Springfield, Mass.
Trus-Con Laboratories, Detroit, Mich.

Paints, Wood Preservative
MOGUL CO., New York, N. Y. 223
TOCH BROTHERS, New York, N. Y. . . . 267
Samuel Cabot, Inc., Boston, Mass.

Palladium
BISHOP, J., & CO., PLATINUM WORKS, Malvern, Pa. 114
BAKER & CO., Inc., Newark, N. J. 100

Palladium—Continued
American Smelting & Refining Co., New York, N. Y.

Palladium, Salts
MERCK & CO., New York, N. Y. 222

Pans, Acidulating
Stedman's Foundry & Machine Works, Aurora, Ind.

Pans, Annealing
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
PALO CO., New York, N. Y. 232

Pans, Cast Iron
U. S. CAST IRON PIPE & FOUNDRY CO., Burlington, N. J. 276

Pans, Chemical, Enameled
ELYRIA ENAMELED PRODUCTS CO., The, Elyria, O. 159
PFAUDLER CO., The, Rochester, N. Y. . . 235
Cleveland Stamping & Tool Co., Cleveland, Ohio

Pans, Concentrating
LEHIGH FOUNDRY CO., Fullerton, Pa. . . 210
MOORE, SAMUEL I., & SONS CORPORATION, Elizabeth, N. J. 224

Pans, Crystalizing
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Pans, Crystalizing, Stoneware
GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179
Farrar & Trefts, Inc., Buffalo, N. Y.

Pans, Drop
KOVEN, L. O., & BRO., Jersey City, N. J. . 205

Pans, Evaporating
MOORE, SAMUEL L., & SONS CORPORATION, Elizabeth, N. J. 224
Cleveland Stamping & Tool Co., Cleveland, Ohio

Pans, Gravel
KOVEN, L. O., & BRO., Jersey City, N. J. . 205

Pans, Grinding and Mixing
KOVEN, L. O., & BRO., New York, N. Y. . 205
PENNSYLVANIA CRUSHER CO., Philadelphia, Pa. 234
Carlin's, Thomas, Sons Co., Pittsburgh, Pa.
Stedman's Foundry & Machine Works, Aurora, Ind.

Pans, Platinum
BAKER & CO., Inc., Newark, N. J. 100
BISHOP, J., & CO., PLATINUM WORKS, Malvern, Pa. 114

Pans, Revolving
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
Hamilton Copper & Brass Works, Hamilton, Ohio

Pans, Salt Cake
BETHLEHEM FOUNDRY & MACHINE CO., South Bethlehem, Pa. 113
LEHIGH FOUNDRY CO., Fullerton, Pa. . 210
MOORE, SAMUEL L., & SONS CORPORATION, Elizabeth, N. J. 224

Pans, Steam
MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221
Hamilton Copper & Brass Works, Hamilton, Ohio

Pans, Steam-Jacketed
BETHLEHEM FOUNDRY & MACHINE CO., South Bethlehem, Pa. 113
Struthers Wells Co., Warren, Pa.

Pans, Sulphuric Acid
LEHIGH FOUNDRY CO., Fullerton, Pa. . . 210

Pans, Vacuum
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
DEVINE, J. P., CO., Buffalo, N. Y. 138–141
GERDES & CO., Inc., New York, N. Y. . . 174
KOVEN, L. O., & BRO., Jersey City, N. J. . 205
LEHIGH FOUNDRY CO., Fullerton, Pa. 210
ROOS', AUGUST, SON, New York, N. Y. . 241
SOWERS MFG. CO., Buffalo, N. Y. 248–251
SPERRY, D. R., & CO., Batavia, Ill. 252
SWENSON EVAPORATOR CO., Chicago, Ill. 256–257
The American Copper & Brass Works, Cincinnati, Ohio
Claussen, J. H., Copper Works, Inc., Brooklyn, N. Y.
Hamilton Copper & Brass Works, Hamilton, Ohio
Kensington Copper & Machine Works, Philadelphia, Pa.

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Pans, Vacuum—Continued
Kilby Mfg. Co., Cleveland, Ohio
Payne & Joubert Mach. & Fdy. Co., Birmingham, Ala.
Providence Coppersmithing Co., Providence, R. I.

Pans, Vacuum
SOWERS MFG. CO., Buffalo, N. Y. 248–251

Pans, Vacuum, Glass Enameled
ELYRIA ENAMELED PRODUCTS CO., The, Elyria, Ohio 159
PFAUDLER CO., Rochester, N. Y. 235

Pans, Vacuum, Stirrers
Hamilton Copper & Brass Works, Hamilton, Ohio

Paper, Filtering. See also Filter Paper
AMERICAN APPARATUS CORPORATION, New York, N. Y. 211
ANGEL, H. REEVE & CO., Inc., New York, N. Y. 96–97
COOPER, CHAS., & CO., New York, N. Y. 132
EIMER & AMEND, New York, N. Y. 154–155
LABORATORY SUPPLY CO., Columbus Ohio 209
PALO CO., New York, N. Y. 232
SCHAAR & CO., Chicago, Ill. 244
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245

Paper Glassine
Wilkinson Brothers & Co., Inc., Philadelphia, Pa.

Paper Sizing Plants
PROCESS ENGINEERS, Ltd., Montreal, P. Q. 237

Paper, Test
SQUIBB, E. R., & SONS, New York, N. Y. 253

Paper Testers. See Testers, Paper

Paper, Tumeric
COOPER, CHAS., & CO., New York, N. Y. 132

Paper, Vegetable Parchment
Wilkinson Brothers & Co., Inc., Philadelphia, Pa.

Paper and Pulp Mill Equipment
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221
PROCESS ENGINEERS, Ltd., Montreal, P. Q. 237
STROUD, E. H., & CO., Chicago, Ill. 259
Biggs Boiler Works Co., Akron, Ohio
Canadian Pulp Mill Mach. Co., Ltd., Montreal, P. Q.
Emerson Mfg. Co., Lawrence, Mass.
Jones, E. D., & Sons Co., Pittsfield, Mass.
Moore & White Co., Philadelphia, Pa.
Rice, Barton & Fales Mach. & Iron Co., Worcester, Mass.
Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.
Shevlin, Geo. F., Mfg. Co., Saratoga Springs, N. Y.
Voith, J. M., Co., Inc., New York, N. Y.
Waterville Iron Works, Waterville, Me.
William Apparatus Co., Watertown, N. Y.

Para-Amidophenol
BARRETT CO., New York, N. Y. 101
HERMAN & HERMAN, Inc., New York, N. Y. 185

Para-Amidophenol, Plants for
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Paracresol
BARRETT CO., The, New York, N. Y. 101

Paraformaldehyde
HEYDEN CHEMICAL WORKS, The, New York, N. Y. 186

Paraldehyde
MERCK & CO., New York, N. Y. 222

Paranitraniline
HERMAN & HERMAN, Inc., New York, N. Y. 185
MERCK & CO., New York, N. Y. 222
Standard Aniline Products, Inc., New York, N. Y.

Paranitraniline Plants
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125

Paranitraniline Plants—Continued
DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Paranitroacetanilid
Edison, Thomas A., Orange, N. J.

Paraphenylenediamine
HERMAN & HERMAN, Inc., New York, N. Y. 185
MERCK & CO., New York, N. Y. 222
Edison, Thomas A., Orange, N. J.

Paraphenylenediamine Acetate
Edison, Thomas A., Orange, N. J.

Para-Phenylenediamine Plants
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125

Paris White
Salomon, L. A., & Bro., New York, N. Y.

Paste, Adhesive
NATIONAL GUM & MICA CO., New York, N. Y. 227

Paste, Phosphoric Acid
Bowker Chemical Co., New York, N. Y.
Iliff-Bruff Chemical Co., Hoopeston, Ill.

Parting Apparatus
BAKER & CO., Inc., Newark, N. J. 100

Pebble Mills. See Mills Ball or Pebble

Pebbles, Flint
ABBE, PAUL O., New York, N. Y. 86–89
ABBÉ ENGINEERING CO., New York, N. Y. 90–93
Atkins, Kroll & Co., San Francisco, Cal.

Penetrometers
DAIGGER, A., & CO., Chicago, Ill. 134
HOWARD & MORSE, New York, N. Y. 190–191

Penstocks
COATESVILLE BOILER WORKS, Coatesville, Pa. 131
MacKINNON, HOLMES & CO., Ltd., Sherbrooke, P. Q. 221

Percolaters
DAY, J. H., CO., The, Cincinnati, Ohio 135
GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179
KOVEN, L. O., & BRO., Jersey City, N. J. 205
Canton Glass Co., Marion, Ind.
Hamilton Copper & Brass Works, Hamilton, Ohio

Perhydrol
MERCK & CO., New York, N. Y. 222

Pestles. See Mortars

Petri Glasses. See Glasses, Petri

Petrographic Apparatus
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264

Pharmaceutical Chemicals, Plants for
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127

Pharmaceutical Machinery
Colton, Arthur, Co., Detroit, Mich.
Stokes, F. J., Machine Co., Philadelphia, Pa.

Phenacetine Plants
DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Phenanthrene
BARRETT CO., New York, N. Y. 101

Phenol
BARRETT CO., New York, N. Y. 101
COOPER, CHAS., & CO., New York, N. Y. 132
HERMAN & HERMAN, Inc., New York, N. Y. 185
MERCK & CO., New York, N. Y. 222
NATIONAL GUM & MICA CO., New York, N. Y. 227
POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240
Bayway Chemical Co., Elizabeth, N. J.
Dow Chemical Co., Midland, Mich.
Edison, Thomas A., Orange, N. J.
Klipstein, A., & Co., New York, N. Y.
Mallinckrodt Chemical Works, St. Louis, Mo.
Rockhill & Victor, New York, N. Y.
United Gas Improvement Co., Philadelphia, Pa.

Phenol Apparatus and Plants
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
DEVINE, J. P., CO., Buffalo, N. Y. 138–141
Farrar & Trefts, Inc., Buffalo, N. Y.
Western Gas Construction Co., Ft. Wayne, Ind.

Phenol Plants
BADGER, E. B., & SONS CO., Boston, Mass. 102–109
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125

Phenol Plants—Continued
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Phenol resin
Edison, Thomas A., Orange, N. J.
Redmanol Chemical Products Co., Chicago, Ill.

Phenolphthalein
MERCK & CO., New York, N. Y. 222
Monsanto Chemical Works, St. Louis, Mo.

Phosphate of Ammonia. See Ammonium Phosphate

Phosphate of Lime (precip.)
R. Bardewyck, New York, N. Y.

Phosphate Plants
Savannah Engineering & Construction Co., Savannah, Ga.

Phosphate Rock
Swift & Co., Chicago, Ill.

Phosphate of Soda. See Sodium Phosphate

Phosphor Bronze, Sheet
The American Brass Co., Waterbury, Conn.
Seydel Mfg. Co., Jersey City, N. J.

Phosphorous, Red
MERCK & CO., New York, N. Y. 222
POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Phosphorous, Yellow
MERCK & CO., New York, N. Y. 222
POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Photographic Chemicals. See Chemicals, Photographic

Photographic Chemicals, Plants for
BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
CANADIAN CHEMICAL & CONSTRUCTION CO., Toronto, Ont. 126–127
DEVINE, J. P., CO., Buffalo, N. Y. 138–141

Photographic Lenses
BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. 111

Photol
MERCK & CO., New York, N. Y. 222

Photometers
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264
Standard Calorimeter Co., East Moline, Ill.

Photomicrographic Apparatus
BAUSCH & LOMB OPTICAL CO., Rochester, N. Y. 111
EIMER & AMEND, New York, N. Y. 154–155
PALO CO., New York, N. Y. 232
SCIENTIFIC MATERIALS CO., Pittsburgh, Pa. 245
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264

Physical Apparatus
EIMER & AMEND, New York, N. Y. 154–155
GAERTNER, WM., & CO., Chicago, Ill. 165
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THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264

Physiological Apparatus
THOMAS, ARTHUR H., CO., Philadelphia, Pa. 264

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Pinions, Raw Hide
GERDES & CO., Inc., New York, N. Y. 174

Pipe
COATESVILLE BOILER WORKS, Coatesville, Pa. 131
DURIRON CASTINGS CO., New York, N. Y. 146–149
ELYRIA ENAMELED PRODUCTS CO., Elyria, Ohio 159
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Otto Gas Engine Works, Philadelphia, Pa.
Patterson Foundry & Machine Co., East Liverpool, Ohio
Wood, R. D., & Co., Philadelphia, Pa.

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Crowell Mfg. Co., Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
McGowan, John H., Co., Cincinnati, Ohio
Wheeler, C. H., Mfg. Co., Philadelphia, Pa.

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American Well Works, Aurora, Ill.
Black-Clawson Co., Hamilton, Ohio
A. S. Cameron Steam Pump Works, New York, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Gardner Governor Co., Quincy, Ill.
Ingersoll-Rand Co., New York, N. Y.
Morris Machine Works, Baldwinsville, N. Y.
Platt Iron Works, Dayton, Ohio
Rumsey & Co., Ltd., Seneca Falls, N. Y.
Taber Pump Co., Buffalo, N. Y.
Wheeler, C. H., Mfg. Co.. Philadelphia, Pa.

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Whinery, S. B., New York, N. Y.
Wood, R. D., & Co., Philadelphia, Pa.
Worthington, Henry R., New York, N. Y.

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Pumps, Deep Well
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McGowan, John H., Co., Cincinnati, Ohio

Pumps, Duplex
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Gardner Governor Co., Quincy, Ill.

Pumps, Electric
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Advance Pump & Compressor Co., Battle Creek, Mich.
McGowan, John H., Co., Cincinnati, Ohio

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Guild & Garrison, Inc., Brooklyn, N. Y.

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Gould & Garrison, Inc., Brooklyn, N. Y.

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GERMAN AMERICAN STONEWARE WORKS, New York, N. Y. 176–179
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Pumps, Hand
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Bowser, S. F., & Co., Inc., Ft. Wayne, Ind.
National Supply Co., Chicago, Ill.
Quigley Furnace & Foundry Co., Springfield, Mass.

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National Transit Pump & Machine Co., Oil City, Pa.
Platt Iron Works, Dayton, Ohio
Rumsey & Co., Ltd., Seneca Falls, N. Y.
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Blackmer Rotary Pump Co., Petosky, Mich.
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Karl Kiefer Machine Co., Cincinnati, Ohio
Rumsey & Co., Ltd., Seneca Falls, N. Y.
Taber Pump Co., Buffalo, N. Y.
Wheeler, C. H., Mfg. Co., Philadelphia, Pa.

Pumps, Sand
Advance Pump & Compressor Co., Battle Creek, Mich.

Pumps, Sewage
UNION STEAM PUMP CO., Battle Creek, Mich. 272–273
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DuBois Iron Works, DuBois, Penna.
Ingersoll-Rand Co., New York, N. Y.
McGowan, John H., Co., Cincinnati, Ohio
National Transit Pump & Machine Co., Oil City, Pa.
Platt Iron Works, Dayton, Ohio
Wheeler, C. H., Mfg. Co., Philadelphia, Pa.
Whinery, S. B., New York, N. Y.
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Bishop-Babcock-Becker Co., Cleveland, Ohio
Buffalo Dental Mfg. Co., Buffalo, N. Y.
Guild & Garrison, Inc., Buffalo, N. Y.
Hubbard's, Norman, Sons, Brooklyn, N. Y.
Ingersoll-Rand Co., New York, N. Y.
Nash Engineering Co., South Norwalk, Conn.
Piqua Blower Co., Piqua, Ohio
Roots, P. H. & F. M., Co., Connersville, Ind.
Rumsey & Co., Ltd., Seneca Falls, N. Y.
Wheeler, C. H., Mfg. Co., Philadelphia, Pa.
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Loomis-Manning Filter Distributing Co., Philadelphia, Pa.
Northern Water Softener Co., Madison, Wis.
Permutit Co., New York, N. Y.
Scaife, Wm. B., & Son Co., Pittsburgh, Pa.

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Haff, Max M., Ottawa, Canada
Hunt, Robert W., & Co., Chicago, Ill.
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Dow Chemical Co., Midland, Mich.
Fergusson Bros., Philadelphia, Pa.
Globe Chemical Co., Cincinnati, Ohio
Hooker Electrochemical Co., New York, N. Y.
Independent Chemical Co., New York, N. Y.
International Chemical Co., Camden, N. J.
Mathieson Alkali Works, Providence, R. I.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pfaltz & Bauer, Inc., New York, N. Y.
Riordon Pulp & Paper Co., Ltd., Montreal, Canada
Thomson, J. M., & Co., New York, N. Y.
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Sodium Nitrite
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Hammond Iron Works, Warren, Pa.
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Knox Pressed & Welded Steel Co., Pittsburgh, Pa.
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BISHOP, J., & CO., PLATINUM WORKS, Malvern, Pa. 114
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Oat, Joseph, & Sons, Philadelphia, Pa.
Struthers Wells Co., Warren, Pa.
Unger, John, S., Chicago, Ill.

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BUFFALO FOUNDRY & MACHINE CO., Buffalo, N. Y. 118–125
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Chemical Importing & Mfg. Co., New York, N. Y.
Commercial Acid Co., St. Louis, Mo.

Zinc Chloride, for Soldering
GRASSELLI CHEMICAL CO., The, Cleveland, Ohio 182
Kalbfleisch, Franklin H., Co., New York, N. Y.

Zinc, Chloride Solution
POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236

Zinc Cyanide
ROESSLER & HASSLACHER CHEMICAL CO., New York, N. Y. 240

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GRASSELLI CHEMICAL CO., The, Cleveland, Ohio 182
American Smelting & Refining Co., New York, N. Y.
Atkins, Kroll & Co., San Francisco, Cal.
R. Bardewyck, New York, N. Y.
Chemical Importing & Mfg. Co., New York, N. Y.

Zinc Dust Precipitation Process
Merrill Metallurgical Co., San Francisco, Cal.

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POWERS-WEIGHTMAN-ROSENGARTEN CO., Philadelphia, Pa. 236
SQUIBB, E. R., & SONS, New York, N. Y. 253
Goldschmidt Detinning Co., New York, N. Y.

Zirconium Silicate
FOOTE MINERAL CO., Inc., Philadelphia, Pa. 161

WM. AINSWORTH & SONS

DENVER, COLO., U.S.A. THE PRECISION FACTORY

PRODUCTS: Assay; Analytical and Pulp Balances and Standard Metric Weights of Precision; Surveying Instruments; Transits; Theodolites and Levels.

ASSAY BALANCES: Catalog A-1

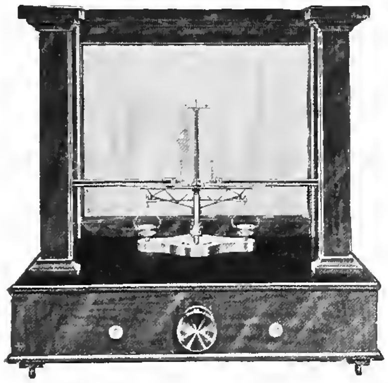
Standard and Inverted Types, .01 to .002 Milligram Sensitivity.

Our line of assay balances comprises both standard and inverted types, each of improved construction with all working parts carried by a metal base which insures the maintenance of alignment of the releasing mechanism in transit and in use.

INVERTED TYPE BALANCES:

After much experimental work and a careful consideration of the relative merits of the inverted type assay balance as compared with the type more commonly used, we have placed an improved balance of this type on the market.

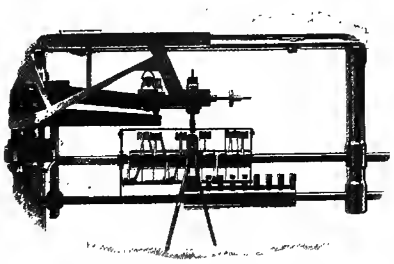
The principal points in favor of this type are that it brings the scale up to the eye-level, decreases the length and weight of the hangers and facilitates the construction with end bearings in the form of flat planes carried by an arm raising them from the edges when at rest.



INVERTED TYPE V ASSAY BALANCE

AINSWORTH IMPROVED MULTIPLE RIDER CARRIER: Catalog A-1.

This device handles the fractional gram weights, and has quickly come into general use for rapid and accurate weighing. The saving in time and in worn and damaged weights will soon pay for the attachment.

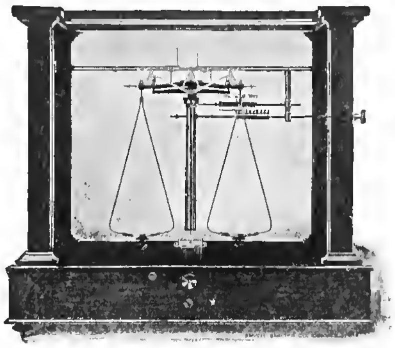


ANALYTICAL BALANCES: Catalog A-1.

From .1 to .02 Milligram Sensitivity.

Our line of Analytical and Chemical balances includes a variety of types covering every requirement, and having hard-rolled aluminum alloy beams, agate edges and planes, improved releasing mechanisms and rider carriers.

When equipped with the Improved Multiple Rider Carrier for handling the fractional gram weights these balances offer the most accurate and rapid means of weighing.



TYPE T ANALYTICAL BALANCE WITH IMPROVED MULTIPLE RIDER CARRIER

STOCK BALANCES

Type	Beam	Capacity	Sensitivity	Price
V Inverted Assay	5″		0.002 Mg.	$300
VB " "	5″		0.003 Mg.	$200
VC " "	5″		0.005 Mg.	$150
RG " "	5″		0.01 Mg.	$100
C Standard "	5″		0.002 Mg.	$300
D " "	4″		0.002 Mg.	$300
A " "	5″		0.003 Mg.	$200
F " "	5″		0.003 Mg.	$200
FB " "	4″		0.005 Mg.	$150
H " "	6″		0.01 Mg.	$125
Q Analytical	7″	200 Grms.	0.05 Mg.	$125
T "	6″	200 Grms.	0.05 Mg.	$125
L "	6″	200 Grms.	0.05 Mg.	$75
M Pulp	6″	200 Grms.	0.5 Mg.	$30

DISCOUNTS ON APPLICATION:

The prices in this catalog are subject to discount, which will be quoted on application.

SPECIAL BALANCES:

When required we can furnish our balances adjusted to higher sensitivities and can make such other alterations as are necessary to adapt them to the special needs of the user.

WEIGHTS OF PRECISION:

We make and carry in stock a complete line of Metric Weights of precision. Our metric weights are guaranteed accurate subdivisions of the International Standard Kilogram as furnished us by the Bureau of Standards at Washington.

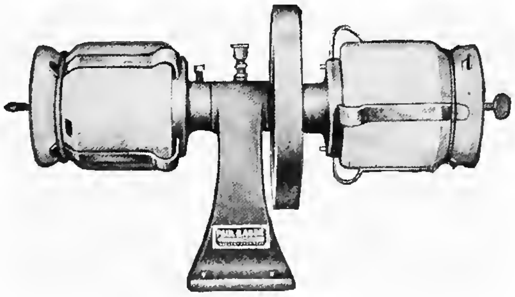
PAUL O. ABBÉ

Crushing, Cutting, Grinding, Mixing, Pulverizing and Sifting Machinery

SEMPER OPUS OPTIMUM PEBBLE MILL ABBE
Trade Mark

JOHNSTON BUILDING **New St. & Exchange Pl.** **NEW YORK, N. Y.**

PRODUCTS: Attrition Mills, Ball Mills, Bolting Reels, Cage Mills, Crushers, Cutters, Disintegrators, Dufour Bolting Cloth, Goggles (acid and dust proof), Hammer Mills, Jar Mills, Knife Grinders, Mixers, Package Packers, Pebble Mills, Respirators, Sifters.

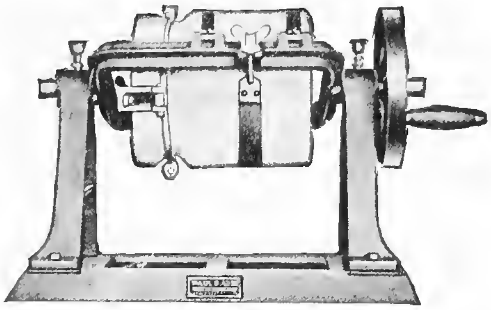


DOUBLE SPECIMEN MILL. PRICE, $22.50

Mills built with either 1, 2, or 5 Jars.
Specimen Jar measures, outside, 5.2 x 5.71 inches.
Capacity, ¼ oz. to 1½ lbs. at a charge, dry. (Sand as unit.)
Capacity, ¼ gallon, wet.

JAR MILLS:

The Jars are made from the very highest grade of Porcelain and will last for years. They are substantially fastened, none of them being held in position by rubber bands.

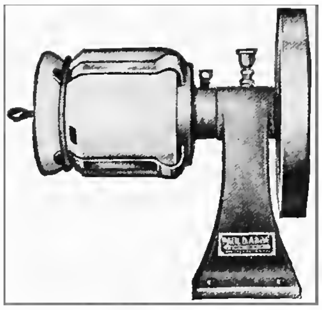


TYPE "A" SINGLE ASSAY MILL. PRICE, $37.50

Mills built with either 1, 2, 3, 4, 6, 8, 9, or 12 Jars.
Assay Jar measures, outside, 8.75 x 9.65 inches.
Capacity, 1 oz. to 5 lbs. at a charge, dry. (Sand as unit.)
Capacity, 1 gallon, wet.

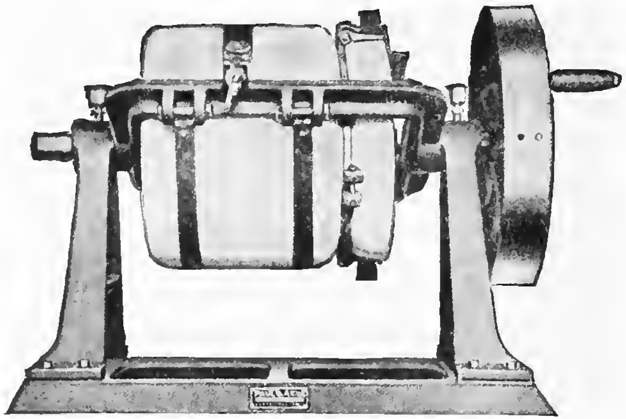
PAUL O. ABBÉ

My equipment is distinguished by this well known black and white mark.



SINGLE BACILLI MILL. PRICE, $18.00

Mills built with 1, 2 or 5 Jars.
The Bacilli Jar is of special form inside, so it can be used for Tubercle Bacilli, etc.
Bacilli Jar measures, outside, 5.75 x 6.5 inches.
Capacity, ¼ oz. to 2 lbs. at a charge. (Sand as unit.)
Capacity, 1/3 gallon, wet.



SINGLE NO. 1 JAR MILL. PRICE, $97.50

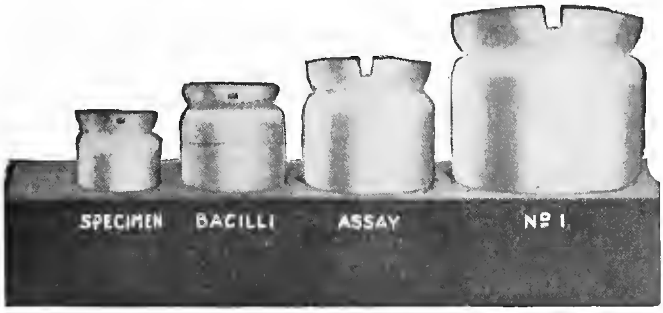
Mills built with either 1 or 2 Jars.
No. 1 Jar measures, outside, 13 x 12.5 inches.
Capacity, 1 to 15 lbs. at a charge. (Sand as unit.)
Capacity, 4 gallons, wet.
Dufour Swiss Silk Bolting Cloth supplied from stock in all grades and numbers.
I issue 3 catalogs: "A"—Ball and Pebble Mills, "B"—Crushers, Cutters and Grinders, and "C"—Mixers and Sifters. Any of these gladly sent on request.

Continued on Next Page

PAUL O. ABBÉ JARS:

Paul O. Abbé Jars are of Standard form, as used for many years, and will be supplied with Neckbands Crossbars, Gaskets, Pebbles, etc., from stock.

In some supply catalogs these are listed as Ball Mills.

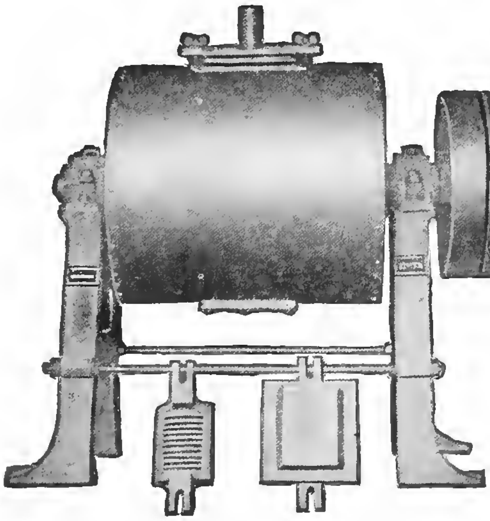


SIZES:

132 x 147 mm.
147 x 170 mm
225 x 245 mm.
332 x 320 mm.

PEBBLE MILLS:

Designed mechanically correct, substantially built of first-class materials throughout. These machines, as well as the Jar Mills, grind and mix dry or wet.



NO. 6 PEBBLE MILL. PRICE, $277.50
Cylinder, 30″ diameter x 33½″ long

These Mills have no contaminating surfaces, create no dust in the working room, cause no loss of material, and reduce all of the product. Produce a uniform finished material, run for years without repairs, are always adjusted and require no dressing, need no attention while operating. Save in power, labor, space and time, no skilled labor required.

USES FOR JAR AND PEBBLE MILLS:

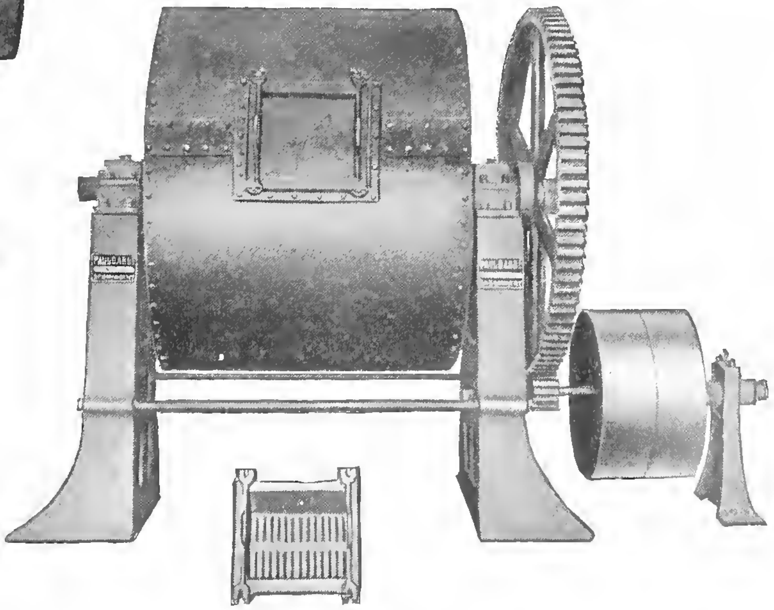
Among the products handled are: Acids, Bacilli, Bone, Bauxite, Cement, Charcoal, Coal, Coke, Carborundum, Corundum, Carmine, Colors in Oil, Fusel Oil, Alcohol, etc., Carbon, Citric Acid, Calcined Lithia Crystals, Copper Paint, Emery, Feldspar, Flint, Frct, Fuller's Earth, Guayule, Guncotton, Iron Turnings, Lactated Food, Lime, Menthol, Marble, Plumbago, Pepsin, Pumice Stone, Quartz, Soapstone, Rotten Stone, Rubber, Silica, Shellac, Slate, Sugar of Milk, Talc, Tobacco, Tungsten, and Zinc Blende.

PEBBLE MILLS — LIST OF SIZES, ETC.

No. of Mill	Diameter of Cylinder	Length of Cylinder	Capacity each charge taking sand as unit Lbs.	Holds in gallons inside of lining	Floor space required	Height	Size of Pulleys	Diameter of Gear Wheel	Amount of Pebbles supplied Lbs.	H. P.		Shipping Weight Lbs.	Speed of Cylinder R. P. M.
										Dry	Wet		
0	6′	8′	4,000	1297	15′ x 10′	9′ 6″	36 x 12″	6′ 8″	8,300	18	9	26,000	13–18
1	6′	5′	2,800	748	13′ 6″ x 10′	9′ 6″	30 x 10″	6′ 8″	5,000	12	6	20,000	13–18
2A	5′	6′	2,200	632	12′ 6″ x 7′	8′	28 x 10″	5′ 3″	4,070	10	5	17,500	18–25
2	5′	4′	1,500	390	10′ 6″ x 7′	8′	28 x 8″	5′ 3″	2,750	8	4	14,750	18–25
3	4′ 6″	3′ 6″	800	270	9′ x 6′	7′	24 x 6″	5′	2,099	5	2½	8,200	25-30
4	3′ 9″	3′ 6″	500	160	7′ 6″ x 6′	6′ 4″	45 x 6″		1,160	4	2	5,500	28–35
5A	3′	4′	350	125	7′ 3″ x 4′ 3″	6′	36 x 6″		880	2¼	1⅛	4,800	35–40
5	3′	3′ 6″	300	100	6′ 9″ x 4′ 3″	6′	36 x 6″		770	2	1	4,200	35–40
6	2′ 6″	2′ 9½″	200	60	5′ 6″ x 3′ 9″	4′ 9″	24 x 4″		440	1½	¾	2,200	38–44
7	2′ 6″	1′ 10¾″	120	36	4′ 9″ x 3′ 9″	4′ 9″	24 x 4″		330	1	½	1,900	38–44
8	1′ 6″	2′ 3″	50	16	3′ 9″ x 2′ 3″	3′ 6″	18 x 2″		125	½	¼	900	40–50

PORCELAIN BALLS, METAL BALLS OR SLUGS:

Porcelain Balls, Metal Balls or Slugs will be furnished with my Jar and Pebble Mills to meet special conditions when wanted, instead of the Hand Selected Flint Pebbles, but at extra cost.



NO. 3 PEBBLE MILL. PRICE, $750.00
Cylinder, 54″ diameter x 42″ long

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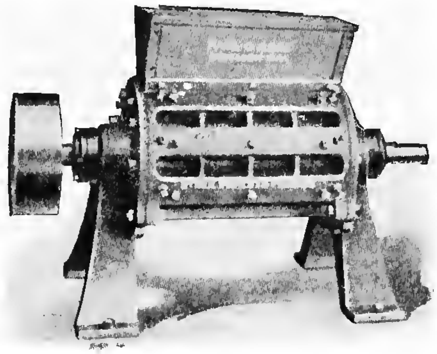
IMPROVED ROTARY CUTTER:

This machine has been on the market for 15 years, over 700 of same being in successful operation. It is built under United States patents, covering all the latest improvements.



NO. 0. ROTARY CUTTER (CLOSED)

USES FOR IMPROVED ROTARY CUTTER:

The Improved Rotary Cutter is well adapted to the reduction of such materials as: Asbestos, Asbestos Scrap, Barks, Boiler Covering, Bones, Bread, Cardboard, Celluloid, Chick Food, Chicory, Chipped Log Wood, Cork, Drugs, Grains of all kinds, Guayule Shrub, Hard Fibre, Hard Rubber, Herbs, Leather, Leaves, Magazines, Mustard, Newspapers, Oat Hulls, Paper, Paper Cones, Pulp, Rags, Rechipper in Sulphite Mill, Roots, Rubber, Sawdust, Shavings, Spices, Spruce Wood Chips, and Spills, Tobacco Stems, Trading Stamps, Coupons, and Books, Vegetable Ivory, Wood Blocks, etc., etc. The machine is so built that it will cut either the most delicate leaves or the hardest roots, such as: Chinese Licorice, Tumeric, Soap Root, Nux Vomica, etc. This machine is used in Boiler Covering Works, Bone and Tallow Plants, Chemical Works, Cork Works, Drug Mills, Feed and Flour Mills, Fertilizer Plants, Grease and Soap Plants, Paper Mills, Rubber Regenerating Works, Spice Mills, Sulphite Mills, etc.

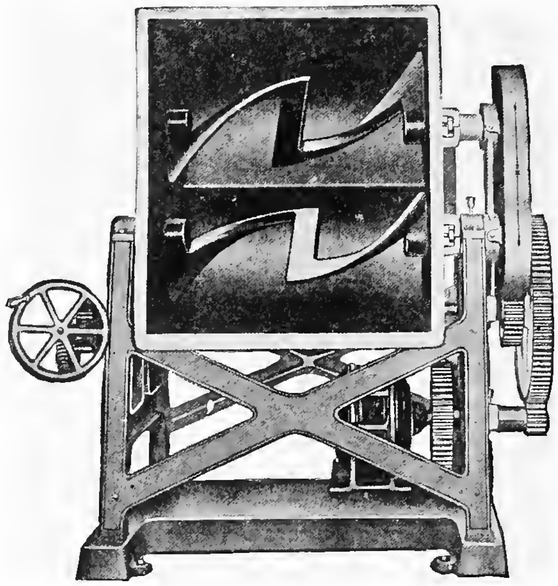
LIST OF SIZES, ETC.

Number of Machine	Floor Space Required	Shipping Weight	Size of Pulley	Speed R. P. M.	H. P. Required	Size of Screen
No. 0	3′1″ x 1′ 5″	500 lbs.	10 x 3″	900 to 1200	2 to 5	10 x 17″
No. 1	4′6″ x 2′10″	1500 lbs.	16 x 6″	600 to 900	5 to 15	20 x 24″
No. 1½	5′8″ x 2′ 6″	2150 lbs.	18 x 8″	600 to 900	10 to 20	25⅞ x 24⅛″
No. 2	5′8″ x 3′ 6″	4000 lbs.	20 x 6″	600 to 900	15 to 40	20¼ x 27½″
No. 2½	8′ x 3′ 3″	6000 lbs.	20 x 9″	500 to 800	20 to 45	35$\frac{5}{16}$ x 35⅞″
No. 3	8′6″ x 3′ 7″	12000 lbs.	30 x 12″	500 to 750	30 to 60	50½ x 29½″

CINCINNATUS MIXER:

This Mixer is of rigid construction and is adaptable for medium heavy work. It will readily handle Greases, Masses, Pastes, Polishes, and powdered materials of all kinds.

It is built in 11 different sizes ranging in mixing capacity from 6½ gallons up to 300 gallons.

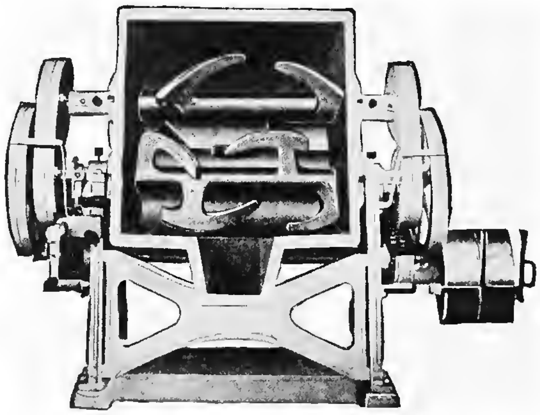


CINCINNATUS MIXER

MASTODON MIXER:

This is the very heaviest type of machine for kneading and mixing the heaviest Compounds, Masses, Pastes, etc., such as: Nitro Cellulose Products, Putty. Rubber, White Lead, etc.

It is built in 6 different sizes ranging in mixing capacity from 13 gallons up to 144 gallons.



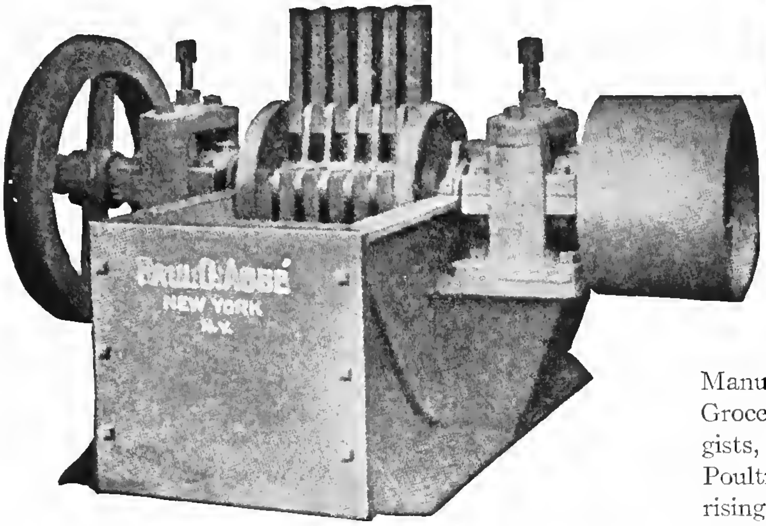
MASTODON MIXER

Both types of machines can be furnished equipped with either cooling or heating jackets

Continued on Next Page

HAMMER MILLS:

These mills are so extensively used that it is hardly necessary to state for what purposes they are adapted. But their greatest field is in the Brick, Coal, Clay, Cement, Cottonseed Cake, Fire Clay, Guano, Limestone, Marl, Phosphate Rock, Soapstone, etc., trades. These Mills are built with a view to hard usage; the entire interior is constructed of the best cast steel, the Hammers of high-grade Manganese Steel, and the Grates of high-grade Carbon Steel.



HAMMER MILL

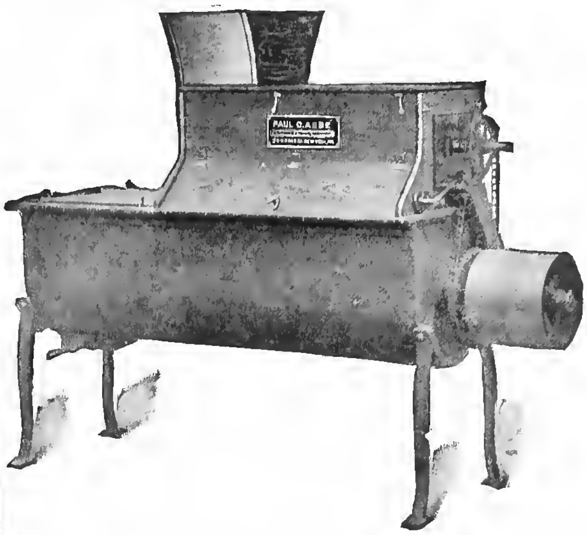
DIMENSIONS, CAPACITIES, ETC.

Name	Size	H. P. Required	Capacity Bones	Capacity Tankage	Capacity (Limestone) ⅛ Bar Opening
BABY	15 x 8	5 H. P.	1 ton	3– 5 tons	½ ton per hour
X	18 x 12	7 H. P.	3– 5 tons	10 tons	1 ton per hour
XA	18 x 14	10 H. P.	6– 7 tons	12 tons	1¼ tons per hour
XB	18 x 16	12 H. P.	10–12 tons	15– 20 tons	1¾ tons per hour
XX	24 x 14	20 H. P.	15–18 tons	25– 30 tons	3 tons per hour
XXB	24 x 16	25 H. P.	18–22 tons	30– 35 tons	4 tons per hour
XXX	30 x 16	40 H. P.	22–28 tons	45– 60 tons	6 tons per hour
XXXD	30 x 22	50 H. P.	35–50 tons	60– 70 tons	10 tons per hour
XXXX	36 x 30	65 H. P.	50–75 tons	100–125 tons	16–20 tons per hour

AUTOMATIC RUBBER RESPIRATORS:

Automatic Rubber Respirator has a perfect filter device, and no sticking Valve Disc as is found in other respirators. It has large capacity and will keep out Dust, Smoke, Fumes and Gases and protects the exposed workman in any occupation. It is made of Soft White Rubber, is easily kept clean, and bends perfectly to fit any face. Many thousands are in use and old customers are continually ordering more. Price $24.00 per doz. On receipt of $2.00 one will be forwarded as a sample. Money refunded if not as represented.

SIFTER AND MIXER:



This is without doubt the most perfect machine of the kind on the market, and supplies a want long felt by Bakers, Breakfast Food, Carbon, Color, Flour and Perfumery Manufacturers, Chicory, Coffee, Commission and Grocery Merchants, Confectioners, Chemists, Druggists, Makers of Baking, Condition, Face, Plate, Poultry, Seidlitz, Tooth, and other Powders, Self-rising Flour, Snuff, Stock Feeds and Spices. All trades requiring dry and lumpy ingredients thoroughly broken up, sifted and blended together quickly at one operation.

An ounce of one powder can be mixed with pounds or hundred-weights of any other, the whole being thoroughly blended before leaving the mixing chamber. This is being constantly proven by many firms who put the blended powders to the most severe analytical tests.

The machine is built in sizes to handle 25, 50, 75, 100, 150, 200, 350, 400, 600, 700, 800, 1000, 1350, 1700, 2000, 3000, and 4000 pounds at a batch, but can also be operated continuously.

RUBBER GOGGLES:

Gas Tight Rubber Goggles are made of a single piece of Pure Rubber and are Waterproof and Sanitary. Many different sizes and shapes of lenses can be used which are replaceable in a moment and are held constrictively. Are fitted with mica lenses for firemen's use. Fits anybody air tight. Does not smoke your eyes out. Price per dozen, $18.00. On receipt of $1.50 will send sample, postpaid.

ABBE ENGINEERING COMPANY

Designers and Builders of Pulverizing and Grinding Machinery

General Offices, 220 Broadway, NEW YORK CITY

PRODUCTS: Ball Mills; Eureka Mills; Jar Mills; Laboratory Mills; Max Mills; Pebble Mills; Sample Mills; Tube Mills; Bolting Cloth; Crushers; Filter Presses; Rotary Cutters; Pressure Blowers; Acid and Vacuum Pumps; Steam Separators.

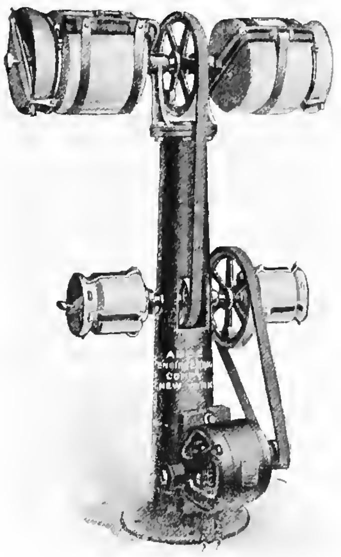
INQUIRIES:

When making inquiries it will greatly facilitate matters if our correspondents will advise us regarding the following points:

1. What material is to be reduced.
2. How coarse it will be fed to the machine.
3. How fine (what mesh) the finished product is to be.
4. Capacity desired per hour.
5. Whether it is to be ground wet or dry.

Whenever possible it is always best to send us a sample of the material by mail, in the state that it will be fed to the machine.

COMBINATION LABORATORY MILL:



COMBINATION LABORATORY MILL

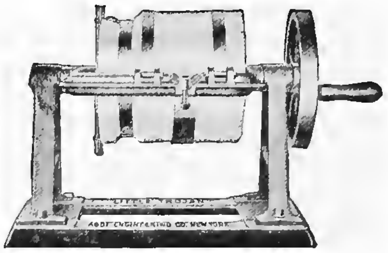
As the result of a number of inquiries for a machine which would be compact, simple and easy of access, we have designed our Combination Laboratory Mill.

It can be arranged for direct motor drive if desired, thus it can be installed in the most convenient part of the laboratory, regardless of line shafts, pulleys, etc.

We manufacture this mill in a very large number of different combinations, having 2 – 4 – 6 – or 12 jars.

The capacity of jars adapted for this machine are:

Sample Jar, up to 1½ lbs. Jar "A," up to 15 lbs.
Laboratory Jar, up to 5 lbs. Jar "B," up to 25 lbs.



THE LITTLE TROJAN JAR MILL

The Jar measures, outside, 8.75 x 9.65 inches. Will handle from a few ounces up to 5 pounds at a charge. Shipping weight, 120 pounds. Floor space, 10½ x 25 inches. Hand wheel-pulley, 9 x 1 inches. 60 revolutions per minute.

TESTING LABORATORY:

We maintain a complete testing laboratory where we have upwards of a dozen of our different Mills constantly set up ready to crush, cut, grind or mix, either wet or dry, any product, and would suggest that prospective purchasers take advantage of this as well as our many years' experience.

Our business has grown to such proportions that it compels us to maintain an institution of this kind. This means an investment of thousands of dollars to us.

Tests will be made in our laboratory free of charge, but the material must be sent to us charges prepaid. If you desire to take advantage of this offer we will gladly send you shipping directions.

USES FOR PEBBLE MILLS:

It is a well-known fact that Pebble Mills are the only agency whereby all kinds of material, such as listed below, can be reduced to an absolutely impalpable powder without bolting:

Chemicals
Colors
Drugs
Enamels
Face Powders
Fibrous Materials
Glazes
Ores, etc.
Acetanilid
Barytes
Bone
Bauxite
Cement
Charcoal
Coal
Corundum
Carmine
Colors in Alcohol
Carbon
Citric Acid
Calcined Lithia Crystals
Copper Paint
Emery
Feldspar
Flint
Fret
Fuller's Earth
Guayule
Guncotton
Iron Turnings
Lactated Food
Lime
Menthol
Marble
Plumbago
Pepsin
Pumice Stone
Quartz
Rotten Stone
Rubber
Silica
Shellac
Slate
Sugar of Milk
Talc
Tobacco
Tungsten, etc.

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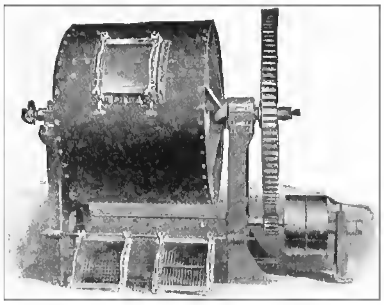


No. 3. ABBÉ PEBBLE MILL. Special Style
(Patented)

PEBBLE MILLS:

No. 3 Pebble Mill with our patented improved manhole frame and covers, with swing bolts and thumb nuts as used on all our Mills from No. 4 to Jumbo size, is shown above. The manhole frames of all our Pebble Mills are made with our *patented detachable flanges*, so that they can be easily replaced with new pieces of flat sheet iron when the inside lining is worn out. These flanges hold the lining in position and gradually wear down with it. To users of these mills this improvement will appeal as an *important factor*, as it avoids riveting in new manhole frames when a machine is to be relined.

The illustration shows how we can attach a stuffing box, with pipe connection, for steam or air inlet on one shaft and a way cock on the other shaft, to enable grinding or mixing material under pressure.

REGARDING PEBBLES:

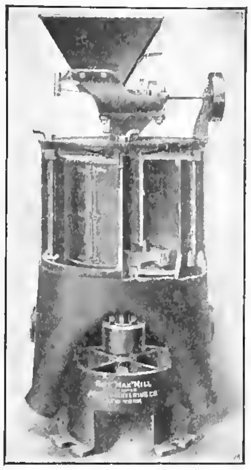
One of the most important things in a Pulverizing Mill is the quality of the Pebbles used in the cylinders. Soft or brittle Pebbles not only wear out very rapidly but also deteriorate the quality of the material being pulverized. Pebbles of uniform shape (round or oval) are far preferable to those of irregular shape. and greatly increase the grinding capacity.

Our Pebbles are very carefully selected as to size, shape and quality.

LININGS:

We equip our mills with either Vitrified Porcelain, Natural Flint (Silex) Chilled Iron, Steel or Wood Linings of the finest quality obtainable.

IMPROVED MAX MILL (Patented):



IMPROVED "MAX" MILL
(Patented)

This Mill in contra-distinction to most other pulverizers is provided with a vertical shaft, thus giving the minimum of vibration, permitting the machine to be set on any floor of a building or even on a light wooden platform. To this vertical shaft is attached a *patented* Carrier provided with specially hardened steel beaters and as the material is fed into the mill, it is thrown by centrifugal force against a corrugated pan, the particles at the same time being thrown into violent contact with each other. The fineness of the finished product is regulated by means of a screen which can be quickly changed to any desired mesh.

The machine can be readily opened and cleaned in a few minutes without disturbing the bearings, driving mechanism or other parts.

The very low cost for repairs and the delivery of a finished product of any desired size, whether finely pulverized or granular without bolting, places our machine upon the highest pinnacle of usefulness as an economical investment.

The bearings are so designed that no oil can possibly contaminate the material being ground.

Each mill is tested at our factory before being shipped.

These mills are especially adapted for granulating and pulverizing the following materials:

Alum
Arsenate of Lead
Arsenate of Zinc
Bone
Charcoal
Chemicals
Clays
Coal
Colors
Drugs
Fuller's Earth
Gums
Kaolin
Lime
Nitre Cake
Ochre
Rosin
Salt
Salt Cake
Salt Petre
Shellac
Spices
Starch
Sugar
Sulphur
Wax, etc.

GENUINE DUFOUR BOLTING CLOTH:

PRICE PER YARD, 40 INCHES WIDE—DISCOUNTS ON REQUEST

Meshes per lineal inch	Number	Standard	Extra heavy X	D'ble Extra XX	Meshes per lineal inch	Number	Treble Extra XXX	Grit Gauze	XXX Grit Gauze
18	0000	$1.60	......	$2.00	......	......	......	No Equals	No. Equals
23	000	1.65	......	2.05	......	......	......	16..0000	14..16
29	00	1.75	......	2.10	......	......	......	18	16..18
38	0	1.80	......	2.15	......	......	......	20 .000	18..20
48	1	1.85	......	2.25	......	......	......	22	20..22
54	2	1.90	......	2.30	......	......	......	24	22..24
58	3	2.05	......	2.45	......	......	......	26..00	24..26
62	4	2.10	......	2.55	......	......	......	28	26..28
66	5	2.15	......	2.65	......	......	......	30	28 .30
74	6	2.20	$2.40	2.70	66	6	$2.80	32	30..34
82	7	2.30	2.55	2.80	74	7	2.90	34 .0	32..36
86	8	2.40	2.65	2.90	82	8	3.05	36	34..38
97	9	2.60	2.85	3.10	86	9	3.25	38	36..40
109	10	2.80	3.10	3.35	97	10	3.50	40	38..42
116	11	3.10	3.40	3.70	109	11	3.80	42	40. 44
125	12	3.40	3.75	4.10	116	12	4.20	44..1	42 .46
129	13	3.75	4 10	4.65	125	13	4.65	46	44..48
139	14	3.90	4.25	4.70	129	14	4.80	48	46..50
150	15	4.15	4.65	5.00	139	15	5.15	50..2	48..52
157	16	4.70	5.15	5.60	150	16	5.80	52	50..54
163	17	5 25	5.75	......	157	17	6.50	54..3	52..56
166	18	6.10	......	......	163	18	7.40	56	54..58
169	19	7.50	......	......	......	......	......	58..4	56..60
173	20	8 50	......	......	......	......	......	60	58..62
178	21	9 20	......	......	......	......	......	62..5	60..64
200	25	10.00	......	......	......	......	......	64	62..66
								66..6	64..68
								68	66..70
								70. 7	68..72
								72	70

Grit-Gauze, all Nos., $3.00
XXX Grit-Gauze, all Nos., $4.00

Cloths made up promptly and in the most perfect manner. Webbing furnished in place of Ticking, if desired.

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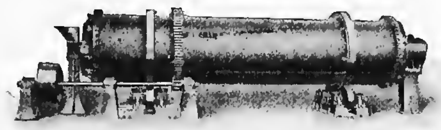
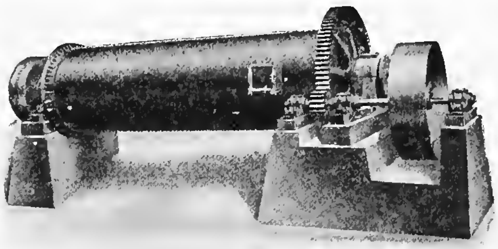


ABBÉ TUBE MILL, TIRE STYLE (Patented)



ABBÉ TUBE MILL, TRUNNION STYLE (Patented)

ABBÉ TUBE MILLS

We build both Tire and Trunnion styles of Tube Mills and offer distinct types of each, the results of our years of practical experience.

The difference in construction of these two styles of machines is shown by the illustrations. We can add that the Tire Mills require 25 to 30 per cent. less power to drive than the Trunnion Mills. This is a specially important feature. For example, a 5′ diameter by 22′ long Trunnion Mill of any make in the market, dry grinding, requires from 85 to 91 H.P. to run and 125 H.P. to start, whereas our Tire Mill of the same size can be operated with the use of from 60 to 65 H.P.

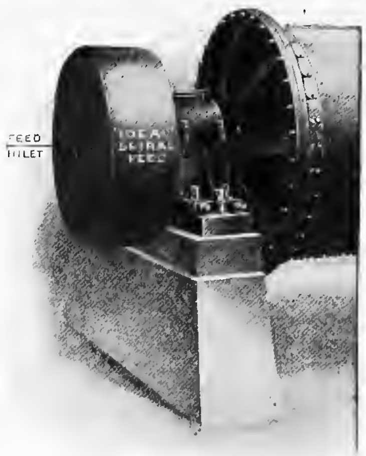
The general principle of grinding employed by Tube Mills is the same as in the ordinary Pebble Mills, the difference being that the material to be ground in the Tube Mill is fed in at one end and delivered as a finished product at the other end, the fineness of the product being regulated simply by the speed at which the material is fed to the machine.

"IDEAL" SPIRAL FEED PATENTED:

The use of the "Ideal" Spiral Feed and Discharge overcomes trouble due to leakage, wearing out of Stuffing Boxes, Joints and Breakage. Mills equipped with our "Ideal" Spiral Feed give a larger grinding capacity, for the reason that it permits loading a tube mill with pebbles from 3″ to 6″ above the center (which in a 5′ x 22′ mill amounts to from 2½ to 3 tons), whereas mills equipped with conveyor feeds can only be loaded to the bottom of their feed opening (usually 4″ below the center) as otherwise the pebbles get into the conveyor and clog it or break it.

In tube mills equipped with the "Ideal" Spiral Feed where the charge of pebbles extends over the center, the balanced portion is proportionately increased, thus reducing the power required to grind a given quantity of material in a given time.

The "Ideal" Spiral Feed and Discharge can be fitted TO ANY MILL ON THE MARKET AT SMALL COST.



"IDEAL" SPIRAL FEED AND DISCHARGE

ABBÉ BALL MILL:

The Abbé Ball Mill with its spiral screen and spiral discharge is the perfection of simplicity in mill construction (see illustration).

Ball Mills, where the grinding chamber is surrounded by the screens, and the grinding plates or steps are perforated so as to allow the ground material to pass through to the screens, have a smaller output than mills where the material passes from one end to the other before it reaches a screen.

This is on account of the many interruptions in the screening surface; the sieving capacity is smaller than the grinding capacity, consequently from 25% to 40% of finished product is returned to the mills again.

The lining steps being perforated cannot be worn down very thin—first, the weight of the balls dropping breaks them, and second, the mills are practically held together by the steps, which must be replaced before the whole structure collapses.

In the Abbé Ball Mill the steps ARE SOLID, rest on wood, which reduces vibration, all steps can be taken out leaving the rest of the machine intact. The lining steps can be worn out before renewing, which reduces cost of repairs.

Our latest model Ball Mill feeds and also discharges at the center. This does away with high foundations above the floor line and the cost of building construction is greatly reduced.

SPIRAL DISCHARGE AND SPIRAL SCREEN:

The Spiral Discharge and Spiral Screen are simply the adaptation of our well known Spiral Tube Mill Discharge, with the addition of the screen, which is intercoiled with the regular Discharge Spiral.

The Spiral Screen consisting of a number of convolutes of different diameters, gives, while revolving, an unobstructed screening surface and yields the greatest capacity possible.

The Spiral Screen receives the reduced material as it leaves the grinding chamber on its largest convolute, sifts it over the whole length of screening surface, and delivers the remaining tailings into the conveyor (shown on sectional cut), which returns them to the grinding chamber for regrinding.

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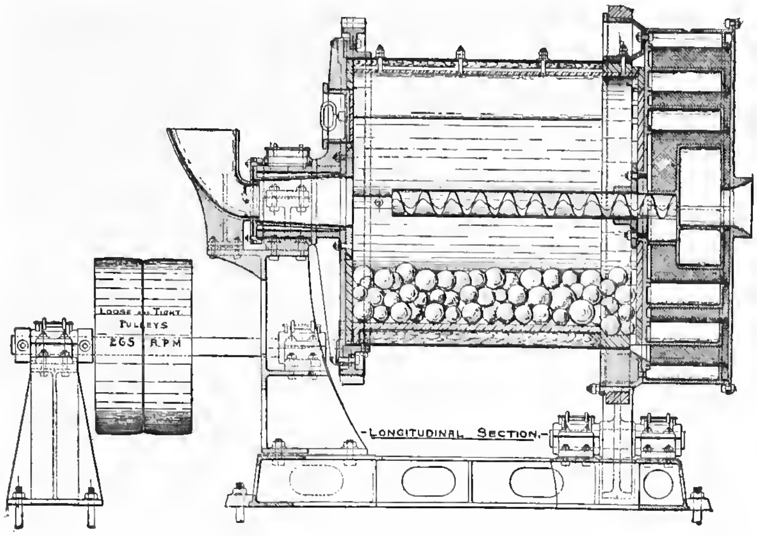


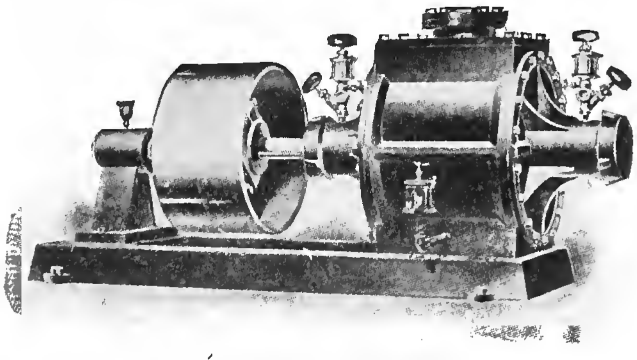
ABBÉ BALL MILL, SECTIONAL VIEW

The different convolutes of the Spiral Screen are surrounded by a Discharge Spiral following the same parallel at a regular distance, under the full length of the Spiral Screen, receiving the sifted material from the different convolutes, conveying it to the centre and discharging it there.

Every portion of the material being reduced receives the grinding action of the Balls while traveling the full length of the machine, before it reaches the screen, so that a far greater grinding capacity is obtained than in mills where material is being discharged onto the screen from the feed end onward.

TABLE FEED:

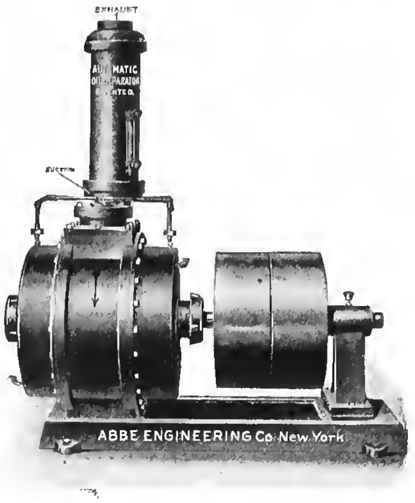
Our Standard Tube Feed is furnished with the Abbé Ball Mill, it insures a uniform amount of material entering the mill continuously, and helps to produce the maximum capacity.



ABBÉ PRESSURE BLOWER

SIZES AND CAPACITY OF PRESSURE BLOWERS.

Size No.	Speed R.P.M.	Capacity Cu. Ft. P.M.	H.P. at 5 lb. Press	Pipe Size	Pulleys Inches	Weight Pounds	Floor Space Required
1	600	6	¼	¾	6 x 1	30	1'3" x 6"
1½	600	9	½	¾	6 x 1	40	1'4" x 6"
2	600	15	¾	¾	6 x 2	50	1'6" x 6"
3	400	28	1¼	1	8 x 2	100	2'0" x 10"
4	400	45	2	1¼	8 x 2	125	2'2" x 10"
5	350	63	3	1½	12 x 3	275	2'6" x 1' 3"
6	350	87	3¼	1½	12 x 4	350	2'8" x 1' 3"
7	300	114	5	2	16 x 4	600	4'1" x 1' 6"
8	300	175	7	2	16 x 6	800	4'5" x 1' 6"
9	300	263	8	4	18 x 6	1100	5'0" x 1' 6"
10	250	500	15	8	20 x 8	2000	5'6" x 2'10"
11	225	730	20	10	22 x 8	2808	6'0" x 3' 0"
12	200	1000	25	12	24 x 10	4000	8'0" x 3' 2"


EXHAUST
AUTOMATIC OIL SEPARATOR PATENTED
SUCTION
ABBE ENGINEERING Co. New York

ABBÉ SINGLE VACUUM PUMP

ACID PUMPS:

We build special composition acid resisting pumps up to any capacity to handle all kinds of acids.

VACUUM PUMPS:

We have manufactured vacuum pumps for the past twenty-four years and we are positive that we have the very best vacuum pump on the market.

Our Patented Pumps cost less, do better work, have no gears or complicated parts, take up less room, and run as quietly as a motor. We guarantee our compound high vacuum pumps to exhaust to within 1/10 inch of the barometer. These pumps are equipped with our patented automatic oiling device which does away with all oil cups, insuring perfect lubrication.

Our single stage vacuum pumps are sold under a guarantee to show 27" or more on the mercury column, the barometer being at 30".

While these single stage pumps cost considerably less, they are the equal in construction, material and workmanship of our patented compound high vacuum pumps.

SIZES AND CAPACITY OF COMPOUND HIGH VACUUM PUMPS.

Size No.	Capacity Cu.Ft. P.M.	Speed R.P.M.	Outlet Inches	Weight Pounds	Horse Power	Pulleys Inches	Floor Space Required
1	6	600	¾	175	¾	8 x 2	1' 8" x 10"
2	9	600	¾	200	1	8 x 2	1' 9" x 10"
3	15	600	¾	225	1½	8 x 2	2' 0" x 10"
4	28	400	1	375	2½	10 x 3	2' 8" x 1' 3"
5	45	400	1¼	425	3	10 x 3	2' 10" x 1' 3"
6	63	250	1½	900	5	16 x 6	3' 3" x 1' 9"
7	87	250	2	1100	5½	16 x 6	3' 6" x 1' 9"
8	114	200	2½	1700	9	18 x 6	5' 4" x 2' 2"

SIZES AND CAPACITY OF SINGLE VACUUM PUMPS.

Size No.	Capacity Cu.Ft. P.M.	Speed R.P.M	H.P. Motor Vacuum 15"	H.P. Motor Vacuum 27"	Outlet Inches	Size of Pulleys	Wt. Lbs.	Floor Space Required
1	6	600	¼	½	¾	6 x 2	50	1'3" x 6"
2	15	600	1	1½	¾	6 x 3	75	1'6" x 6"
3	28	400	1½	2½	1	10 x 3	150	2'0" x 10"
4	45	400	2	3	1¼	10 x 4	200	2'2" x 10"
5	63	350	3	5	1½	12 x 4	400	2'6" x 1' 3"
6	75	300	3½	5½	1½	16 x 4	450	2'8" x 1' 3"
7	114	300	6	9	2	16 x 6	655	4'1" x 1' 6"
8	175	300	7	11	2½	18 x 6	1100	4'5" x 1' 6"
9	263	300	8	12	6	18 x 8	1500	5'0" x 1' 6"
10	500	250	15	30	8	22 x 8	2500	5'6" x 2'10"
11	730	225	20	35	10	24 x 10	3200	6'0" x 3' 0"
12	1000	200	25	50	12	30 x 12	4000	8'0" x 3' 2"

ALBERENE STONE COMPANY

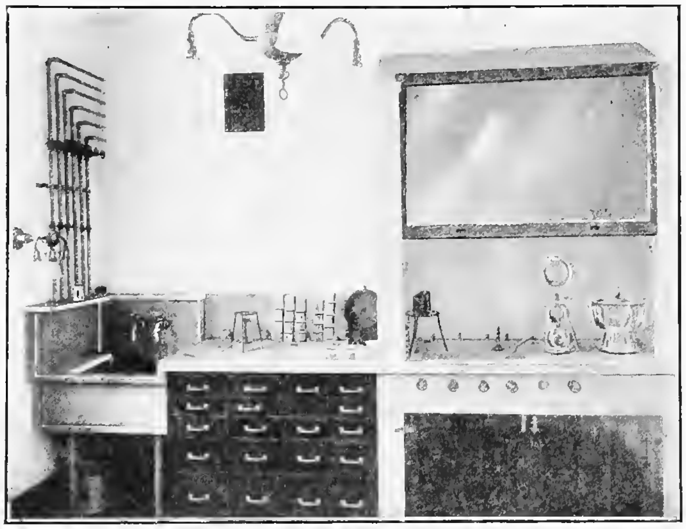
223 East 23d St. NEW YORK

BOSTON, MASS.
162 Dover St.
PITTSBURGH, PA.
CINCINNATI, O.

CHICAGO, ILL.
214-222 No. Clinton St.
NEWARK, N. J.
307 Prudential Bldg.
DETROIT, MICH.

PHILADELPHIA, PA.
950 N. Darien St.
MINNEAPOLIS, MINN.
ST. LOUIS, MO.

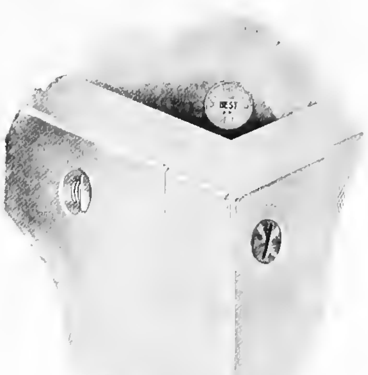
PRODUCTS: Laboratory Fixtures, Table Tops, Backs, Shelves, Supports, Sinks, Hood Bases, Superstructure for Hoods, Tanks, Gutters, Flooring, Window Sills, Steam Baths, Sand Baths, Flues, Strainers and Furnace Linings.



FUMEHOOD, TABLE TOP, SINK AND SHELF OF ALBERENE STONE

GENERAL:

ALBERENE STONE is the trade name applied exclusively to the output of the quarries of the Alberene Stone Company and serves both as an identification and a guarantee of quality and service. ALBERENE STONE is a natural quarried stone, gray in color, close-grained, non-porous and of uniform density and hardness. The non-absorbent quality of ALBERENE STONE renders it acid and alkali resistant for table tops, sinks, gutters, and shelving for laboratory use. Acids and alkali have very slight action upon the stone. Samples furnished for test prior to installation.

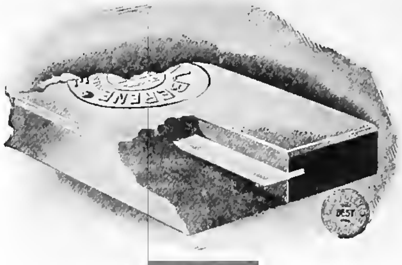


TONGUE, GROOVED AND BOLTED JOINT

FIXTURES:

Table tops for Industrial and Research laboratories of ALBERENE STONE are proving most satisfactory. The construction is similar to that shown in the accompanying cuts. The slip-tongue joint makes possible the erection of table tops of any length required, with joints that are almost imperceptible.

Sinks, gutters and tanks are made up with a tongued and grooved joint, similar to that shown in cut, which render these fixtures perfectly water-tight. By the use of proper cement, long service can be secured.



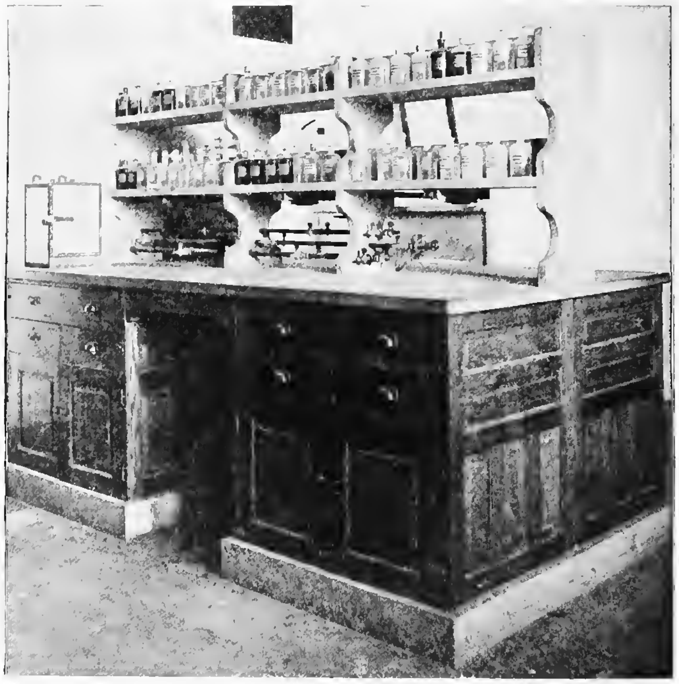
SLIP-TONGUE JOINT

FUME HOODS:

The non-absorbent quality of ALBERENE STONE together with its density renders it a splendid resistant to the action of fumes and makes possible a permanent superstructure with practically no maintenance charge.

INSTALLATION:

The Alberene Stone Company assumes responsibility for the delivery of the material to the building and its erection in position on foundations to be provided by this company, or by the owners or other contractors. The company is, therefore, in a position to complete the interior equipment of a laboratory consisting of table tops, shelving, sinks, gutters and hoods, excluding plumbing connections and fittings, but including pipe frame supports or cabinet work where required.



ALBERENE TABLE TOP, SHELF, SUPPORTS, FLOORING AND BASE

CO-OPERATION AND RESPONSIBILITY.

Based on thirty years experience the Alberene Stone Company will gladly furnish information concerning equipment and prepare details. This Company guarantees its products against defective material and workmanship.

AMERICAN STEAM PUMP COMPANY

MANUFACTURERS OF MARSH AND AMERICAN STEAM AND POWER DRIVEN PUMPING MACHINERY AND AIR COMPRESSORS

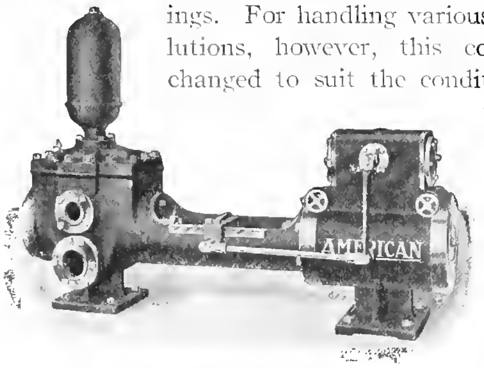
BATTLE CREEK, MICHIGAN

CHICAGO OFFICE: 1220 Monadnock Block
NEW YORK OFFICE: 17 Battery Place

PRODUCTS: Air Compressors, Steam and Power Driven: Boiler Feed Pumps, Tank Pumps, Wet and Dry Vacuum Pumps, Acid Pumps, Hydraulic Pressure Pumps, Deep Well Pumps, Jet Condensers, Centrifugal Pumps.

CONSTRUCTION:

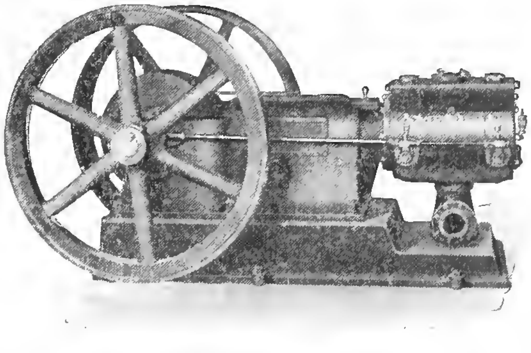
All Marsh and American pumps are fully bronze fitted at regular prices, including solid bronze piston rods and cast bronze removable water cylinder bushings. For handling various chemical solutions, however, this construction is changed to suit the conditions. Either the steam or power driven pumps may be equipped with ball valves when so desired for handling thick or heavy liquids. Marsh and American Pumps are extremely simple in design, and the number of wearing parts are reduced to a minimum. Steam valves are of the balanced piston type of the most approved design, and will not allow the pump short-stroke or race. A steam saving of 25% is guaranteed over the duplex type of pump.



AMERICAN BOILER FEED PUMP

Power pumps are furnished in both single and duplex types with capacities ranging from 5 to 1500 gallons per minute.

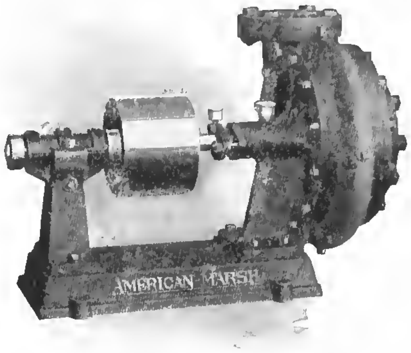
Marsh and American steam and power driven air compressors have capacities ranging from 3 to 850 cubic feet per minute. Sizes 10 x 12 and larger are equipped with Corliss intake valves as shown in the illustration. Frames are furnished either open or enclosed as desired.



AMERICAN IMPROVED BELT DRIVEN AIR COMPRESSOR
12-INCH STROKE. CORLISS INTAKE PATTERN

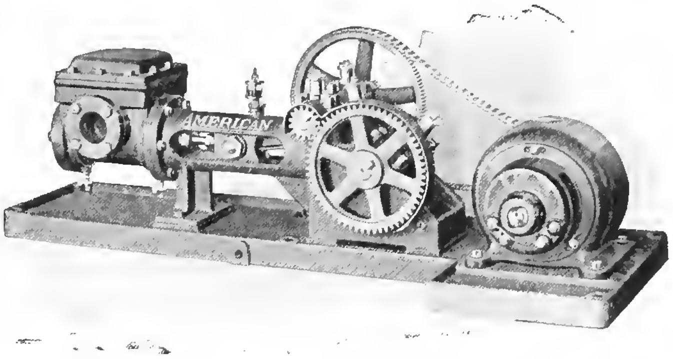
CATALOG:

We issue twenty-five separate bulletins illustrating and describing our entire line. A complete set in bound form will be furnished promptly upon request. In it is described practically every type of pump found in the modern chemical plant.



AMERICAN-MARSH CENTRIFUGAL PUMP

Pump Number	Size Delivery	Size Suction	Gallons per Minute			Pulley		Weight Iron
			Min.	Nor.	Max.	Dia.	Face	
¾	¾	1	5	10	15	3	2	25
1	1	1¼	15	25	35	4	3	45
1½	1½	2	35	55	75	4	4	110
2	2	2½	75	100	125	4	4	150
2½	2½	3	100	150	200	5	5	200
3	3	4	180	225	300	6	6	240
3½	3½	4½	275	325	425	6	6	310
4	4	5	300	425	525	8	6	380
5	5	6	500	700	900	10	8	525
6	6	8	700	925	1200	10	10	650
8	8	10	1200	1800	2200	14	12	1100
10	10	12	2400	3000	3400	16	14	1400



AMERICAN MOTOR DRIVEN VACUUM PUMP

Diameter Cylinder	Stroke	Gallons per Minute	Suction Fipe	Delivery Pipe	Pulley			Ratio Gears	Floor Space	Weight
					Diameter	Face	R. P. M.			
2	3	6	1½	1¼	14½	2½	240	3 to 1	11 x 24	125
2½	3	10	1½	1¼	14½	2½	240	3 to 1	11 x 24	125
3	3	14	1½	1¼	14½	2½	240	3 to 1	11 x 24	125
3½	3	17	1½	1¼	14½	2½	240	3 to 1	11 x 24	125
3	6	17	2	1¼	20	4½	200	4 to 1	16 x 40	520
3½	6	23	2	1½	20	4½	200	4 to 1	16 x 42	540
3⅝	6	25	2	1½	20	4½	200	4 to 1	16 x 42	545
4	6	32	2½	2	20	4½	200	4 to 1	18 x 44	585
4½	6	40	3	2½	20	4½	200	4 to 1	18 x 44	585
5	6	50	3	2½	20	4½	200	4 to 1	18 x 44	590
5½	6	60	3	2½	20	4½	200	4 to 1	18 x 44	600
6	6	72	3	2½	20	4½	200	4 to 1	18 x 44	630

H. REEVE ANGEL & CO., Inc.

Sole Representatives in the U. S. A. and Canada for W. & R. Balston, Ltd., Maidstone, England

120 Liberty St.
NEW YORK, N. Y.

PRODUCTS: WHATMAN FILTER PAPERS of high grade, for all purposes of Chemical Analysis (Quantitative and Qualitative), Folded Filters, Fat Extraction Thimbles, Diffusion Shells, etc., etc. Genuine Hand Made WHATMAN DRAWING PAPERS.

WHATMAN FILTER PAPERS:

All grades are guaranteed free from Starch and Chlorine.

All Whatman Circles are put up in sealed boxes, distinctively labeled.

WHATMAN NO. 1 FILTER PAPER:

A high-grade chemical Filter Paper for general quantitative and qualitative work. This paper is made from high class materials, is tasteless, free from chlorine and has been so specially prepared as to render it **free from starch.** It, moreover, retains Barium Sulphate when properly precipitated.

In sheets 18¼ in.x 22½ in. Price $28.80 per 1,000 sheets. $3.24 per 100 sheets.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	7¼	9½	10⅝	12½	15¼	15¾	19⅝
Ash per circle in Grammes	.00017	.00028	.00046	.00076	.0011	.0016	.0021	.0032	.0054	.0068	.0096	.0138	.0150	.0233
Price per 100	$0.12	0.13	0.14	0.19	0.22	0.24	0.34	0.41	0.78	1.02	1.26	1.50	1.68	2.58

WHATMAN NO. 2 FILTER PAPER:

A paper similar in its general characteristics to No. 1 quality, but thicker, being about 50% heavier. It filters fine precipitates rapidly, the filtrate being clear and bright.

In sheets 18¼ in. x 22½ in. Price $44.16 per 1000 sheets. $5.04 per 100 sheets.

Diam. in Cms	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Diam. in Ins	2¼	2¾	3½	4⅜	5	5⅞	7¼	9½	10⅝	12½	15¼	15¾	19⅝
Price per 100	$0.18	0.19	0.26	0.34	0.36	0.46	0.58	0 90	1.20	1.44	1.86	2.22	3.12

WHATMAN NO. 3 FILTER PAPER:

A paper of the same quality as No. 2, but made slightly heavier still. It is, therefore, specially suitable for use in pressure and vacuum filters. It filters fairly fast, and at the same time retains fine precipitates.

In sheets 18¼ in. x 22½ in. Price $75.60 per 1000 sheets. $8.34 per 100 sheets

Diam. in Cms	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Diam. in Ins	2¼	2¾	3½	4⅜	5	5⅞	7¼	9½	10⅝	12½	15¼	15¾	19⅝
Price per 100	$0.29	0.31	0.44	0.54	0.58	0.72	0.96	1.44	1.92	2.34	3.06	3.66	5.04

WHATMAN NO. 4 FILTER PAPER:

A paper made of very soft material, and therefore open in texture. It is suitable for filtering fruit juices, syrups, oils, varnishes, etc., where rapidity in obtaining clear filtrates is desirable.

In sheets 18¼ in. x 22½ in. Price $44.16 per 1000 sheets. $5.04 per 100 sheets.

Diam. in Cms	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Diam. in Ins	2¼	2¾	3½	4⅜	5	5⅞	7¼	9½	10⅝	12½	15¼	15¾	19⅝
Price per 100	$0.18	0.19	0.26	0.34	0.36	0.46	0.58	0.90	1.20	1.44	1.86	2.22	3.12

WHATMAN NO. 5 FILTER PAPER:

This paper has been made of the purest material, and has been subjected to a special hardening process. It is very **strong and close in texture,** and will retain such fine precipitates as Barium Sulphate and Lead Sulphate, the latter even when freshly precipitated.

In sheets 18¼ in. x 22½ in. Price $54.00 per 1000 sheets. $6.00 per 100 sheets

Diam. in Cms	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Diam. in Ins	2¼	2¾	3½	4⅜	5	5⅞	7¼	9½	10⅝	12½	15¼	15¾	19⅝
Price per 100	$0.29	0.30	0.43	0.53	0.56	0.71	0.94	1.42	1.86	2.28	3.00	3.60	4.98

Continued on Next Page

WHATMAN NO. 30 FILTER PAPER:

This filter paper is of the same high quality as the foregoing grades, but has been so treated as to remove as far as possible by Hydrochloric Acid such chemical salts as are normally contained in the fibre. This paper, having low ash and close texture, is more suitable for quantitative work than No. 1.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	18.5	Larger Sizes to special order only
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	7¼	
Ash per circle in Grammes	.00013	.00020	.00031	.00056	.00089	.00108	.00159	.00252	
Price per 100	$0.35	0.35	0.45	0.60	0.75	0.95	1.25	1.65	

WHATMAN NO. 31 FILTER PAPER:

A Filter Paper similar in its general features to Whatman No. 30, but considerably more rapid in filtration. Sizes and prices as No. 30.

WHATMAN NO. 40 FILTER PAPER—"ASHLESS":

This paper having been subjected to a combined treatment of Hydrochloric and Hydrofluoric Acids is lower in ash content than No. 30, the Hydrofluoric Acid having the effect of removing traces of silicious matter. This paper is **recommended for quantitative work in which a high degree of accuracy is desirable.** The paper being pure gives a very low ash, and, being close in texture, will retain the finest precipitates.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	Larger Sizes to special order only.
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	
Ash per circle in Grammes		.00006	.000096	.00016	.00024	.00030	.00043	
Price per 100	Cut to Order only	$0.66	0.72	1.08	1.32	1.44	1.68	

WHATMAN NO. 41 FILTER PAPER—"ASHLESS":

This filter paper is somewhat similar to No. 40, having been subjected to the same dual treatment of acids, but being softer in texture and more open it is rather quicker in filtration. This paper is not recommended for use where very fine precipitates are to be retained unless they have been properly precipitated. Sizes and prices same as for No. 40.

WHATMAN NO. 42 FILTER PAPER—"ASHLESS":

This paper resembles Nos. 40 and 41 in chemical qualities, but differs in its physical properties, being much harder and extremely close in texture. These features render it particularly suitable for use in filter pumps.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	Larger Sizes to special order only.
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	
Price per 100	Cut to order only	$0.66	0.72	1.08	1.32	1.44	1.68	

WHATMAN NO. 43 FILTER PAPER—"ASHLESS":

These papers, in addition to being treated with HCl. and HF. Acids, have been subjected to an additional chemical process which renders them **fat-free**. In all other respects they correspond to No. 41.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	Larger Sizes to special order only
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	
Ash per circle in Grammes. (Ash weights same as No. 40.)								
Price per 100	Cut to order only.	$0.82	0.90	1.32	1.62	1.80	2.16	

WHATMAN NO. 44 FILTER PAPER—"ASHLESS":

A paper of thinner substance than Nos. 40–43, but treated in the same manner with HCl. and HF. Acids. This paper is rather slower in filtration than Nos. 40 and 41, but it contains less ash and will retain very fine precipitates. It is recommended for use where the greatest possible degree of accuracy in quantitative work is required.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	Larger Sizes to special order only
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	
Price per 100	Cut to order only.	$0.82	0.90	1.32	1.62	1.80	2.16	

WHATMAN NO. 50 FILTER PAPER:

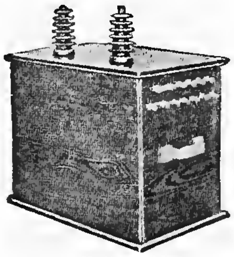
This paper is specially hardened by treatment with Nitric Acid and is very tough. It can be used again and again, the hard, smooth surface of the paper admitting of precipitates being scraped off without injury to the paper itself. Will resist great pressure and retain the very finest precipitates.

Diam. in Cms	4.25	5.5	7	9	11	12.5	15	18.5	24	27	32	38.5	40	50
Diam. in Ins	1⅝	2¼	2¾	3½	4⅜	5	5⅞	7¼	9½	10⅝	12½	15¼	15¾	19⅝
Price per 100	$0.54	0.67	0.72	1.08	1.32	1.44	1.68	2.22	3.42	4.50	5.46	7.20	Cut to order only	11.82

AMERICAN TRANSFORMER COMPANY

147 Miller St.
NEWARK, N. J.

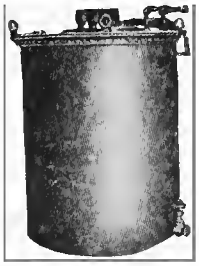
PRODUCTS: Transformers for Electric Furnace Work, Electrochemical Processes and Laboratory Work, High and Low Voltage Testing, Electric Welding, High Frequency Testing, Ozone Generation, Cottrell Electrical Precipitation Systems, Auto Transformers as Regulators, Radio Operation and Experimentation, Lighting and Power.



High Potential Transformer

Air Cooled Furnace Transformer

Portable Oil Testing Outfit Type TS-6



Water Cooled Furnace Transformer

CUSTOM MADE:

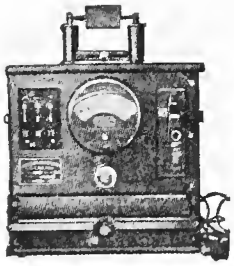
We specialize in the designs and construction of made-to-order transformers, and our experience and manufacturing facilities equip us to fill every requirement in this line.

Engineers connected with the Electrochemical and Metallurgical industries have their own ideas as to the proper applications of alternating current for their purposes. The use of transformers is obviously the most effective method to achieve the best results.

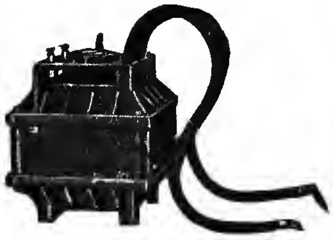
American Transformers are the result of special study of requirements of industrial applications. Their efficiency, operating economy and long life have made them pre-eminent in their field, a fact attested to by their hundreds of satisfactory installations.

CO-OPERATION:

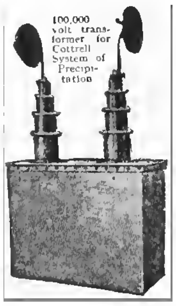
Should you need a transformer for special purposes and conditions, beyond the usual commercial types, we will be glad to co-operate with you and help you solve your problems. When writing for estimates, send us complete data covering your requirements.



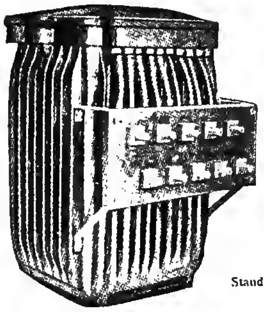
30,000 Volt Testing Set with Regulator and Instruments



Laboratory Furnace Transformer.



100,000 volt transformer for Cottrell System of Precipitation

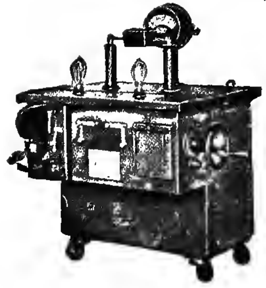


Heavy Current Oil Cooled Transformer.

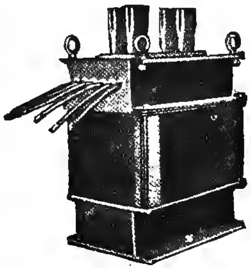
Standard Distributing Transformer.

High Frequency, High Voltage Testing Set, 200,000 Volt, 200,000 Cycles

Portable ½ Kva Laboratory Transformer 1 to 64 Volts in 1 Volt Steps



50,000 Volt Testing Set.



150-K.V.A. Heavy-Current Air-Cooled Transformer

THE ABOVE ILLUSTRATIONS SERVE TO SUGGEST THE GREAT VARIETY OF EQUIPMENT WE ARE PREPARED TO BUILD FOR SPECIFIC CHEMICAL ENGINEERING REQUIREMENTS.

ARMSTRONG CORK CO.

PITTSBURGH, PA.

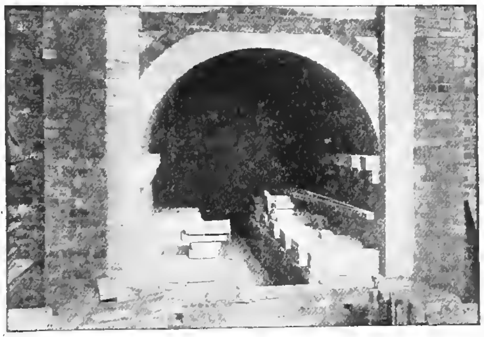
PRODUCTS: Nonpareil Insulating Brick for the Insulation of Industrial Furnaces, Ovens, Kilns, Regenerators, Boiler Settings, etc., Insulating Cement.

Nonpareil High Pressure Covering for the insulation of High Pressure and Superheated Steam Lines, Feed Water Heaters, Enameling and Japanning Ovens, etc.

Nonpareil Cork Covering for the insulation of Brine-Ammonia, and Drinking Water Lines.
Nonpareil Corkboard for the insulation of all kinds of Cold Storage and Accurate Temperature Rooms.

NONPAREIL INSULATING BRICK:

Nonpareil Insulating Brick for industrial furnaces, ovens, hot blast mains, boiler settings, etc., are composed principally of diatomaceous earth. This peculiar material is practically pure silica, being composed of the skeletons or shells of microscopic plants that grew in the sea ages ago. It is estimated that there are 39 billions of these shells to the cubic inch, each one hollow and filled with air. It is this large amount of "dead" or entrapped air which gives Nonpareil Insulating Brick their high heat insulating value. They are, in fact, ten times more efficient nonconductors of heat than fire brick or common brick. In other words, one 4½ inch course of Nonpareil Brick will retain as much heat as a wall of common brick or fire brick 45 inches thick.



ENAMELING FURNACE INSULATED WITH NONPAREIL INSULATING BRICK
Ingram-Richardson Manufacturing Company, Beaver Falls, Pa.

ADVANTAGES:

Nonpareil Brick will reduce greatly the amount of heat ordinarily lost by conduction and radiation through the walls, arches, bottoms, and doors of furnaces, ovens, boiler settings, etc. This results in a material saving in fuel which, under ordinary conditions, is sufficient to pay for the cost of the brick in a year or less. Furthermore, equipment that is insulated with Nonpareil Brick can be operated with lower combustion chamber temperatures, which largely reduce wear and tear of the brick work, and make frequent repairs unnecessary. In addition, conditions surrounding high temperature equipment are made more comfortable for the workman.

ADAPTABILITY:

The convenient form of Nonpareil Insulating Brick makes them quite easy to handle and install. Their strength is sufficient to support any load ordinarily encountered, when they are built in as an integral part of the structure to be insulated. While in no sense a refractory material, Nonpareil Brick will withstand temperatures up to 1800° F. without change of form.

SIZES, SHAPES AND WEIGHTS:

The standard straight Nonpareil Insulating Brick are nominally 9 x 4½ x 2½ inches, and weigh approximately 1½ pounds each. A variety of special shapes are also carried in stock.

NONPAREIL HIGH PRESSURE COVERING:

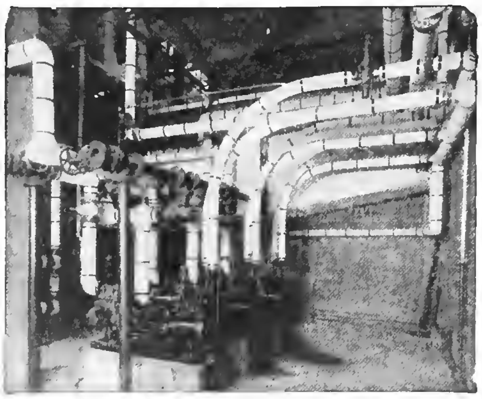
Nonpareil High Pressure Covering is also made of diatomaceous earth, combined with asbestos fiber, and here again the remarkable heat insulating value of the former material is utilized.

ADVANTAGES:

Compared with other coverings, Nonpareil High Pressure Covering is not only a better nonconductor of heat, but will withstand much higher temperatures without calcining or disintegrating. It is particularly well suited, therefore, for the covering of superheated steam lines, and in the block form is an ideal insulation for enameling and japanning and other kinds of ovens. Moreover, it will bear repeated wetting and drying without injury, and for this reason is especially suitable for the insulation of underground steam lines, and those which come in contact with excessive moisture.

APPLICATION:

Nonpareil High Pressure Covering is furnished in sectional and block form of various thicknesses, and also as plastic cement. It can be easily applied under all conditions.



STEAM LINES INSULATED WITH NONPAREIL HIGH PRESSURE COVERING
Ohio Mechanics Institute, Cincinnati, Ohio

NONPAREIL CORK COVERING:

Nonpareil Cork Covering is the only thoroughly satisfactory covering for brine, ammonia, and ice water lines, and cold pipes generally. It consists solely of pure granulated cork, compressed and moulded in sectional form to fit the different sizes of pipe and various fittings in ordinary use. It is coated inside and out with a mineral rubber finish, and is applied with waterproof cement on the joints, rendering them impervious to moisture.

DRINKING WATER SYSTEMS:

Nonpareil Cork Covering is the ideal insulation for drinking water systems in mills, factories, office buildings, etc. Its high insulating efficiency insures water being delivered at the proper temperature, and its moisture resisting properties make it remarkably durable in service.

NONPAREIL CORKBOARD:

Nonpareil Corkboard is the world's standard insulation for cold storage rooms of all descriptions. It is made entirely of pure granulated cork, compressed and baked in boards 12 inches wide, 36 inches long, and in various thicknesses.

SAMPLES AND LITERATURE:

Samples of any of the above products, together with literature describing their properties and uses in all industries, will be cheerfully sent on request.

BAKER & CO., INC.

NEW YORK OFFICE
Hudson Terminal Bldg.
30 Church St.

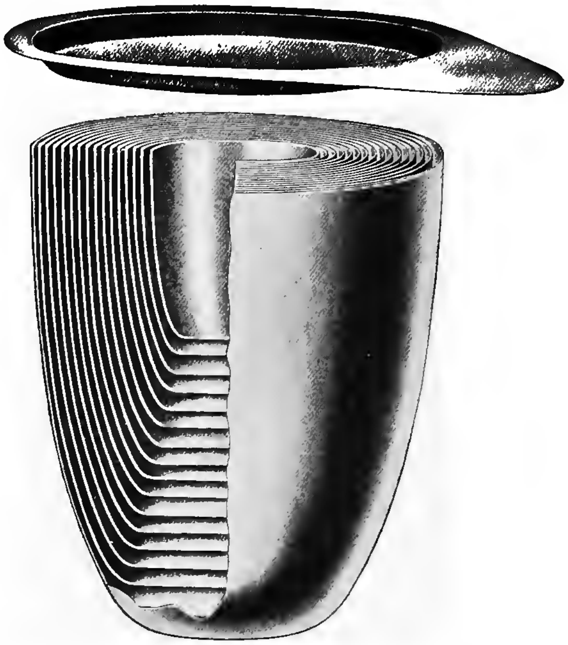
Murray & Austin Streets
NEWARK, N. J.

Cable Address
BAKER, Newark
PLATINUM, New York

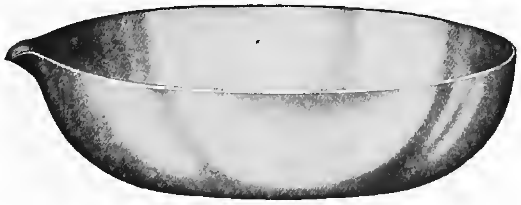
PRODUCTS: **Platinum Labaratory Apparatus including: Crucibles, with and without covers; Crucibles, J. Lawrence Smith form; Crucibles, Gooch form; Combustion Tubes; Combustion Boats; Combustion Apparatus, Shimer; Stills; Parting Apparatus; Retorts; Dishes; Pans; Muffles; Triangles; Filter Cones; Filter Crucibles, Gooch form; Anodes, Gold and Platinum; Cathodes, Gold and Platinum; Electrolytic Separation Apparatus; Spoons; Tweezers; Tongs; Stirring Rods; Platinum Wire; Platinum Sheet; Platinum Sponge; Platinum Black; Platinized Asbestos; Platinum Rhodium; Salts and Solutions of Platinum, Gold and Silver; Iridium; Palladium; Osmium; Ruthenium; Rhodium. Platinum scrap purchased.**

PLATINUM WARE:

All forms and sizes of platinum ware for chemical and physical purposes, either of pure platinum or any desired alloy, including retorts, bottles, crucibles, tubulated crucibles, J. Lawrence Smith form crucibles for alkali determination, Gooch form crucibles, combustion tubes, combustion boats, shells for water analysis, shells for sugar and milk analysis; incinerating pans, muffles, triangles, filter cones, Classen form shells for electrolytic separations, anodes and cathodes of all forms, tweezers, tongs and stirring rods. All this ware is hammered to shape, tested and finished in the most approved manner and guaranteed free from flaws and blisters. Old dishes, crucibles and appliances of all forms reshaped, repaired, purchased or exchanged for new ware. Special designs of ware made to order from drawings.



PLATINUM CRUCIBLES WITH OR WITHOUT COVERS
Hammered and Guaranteed



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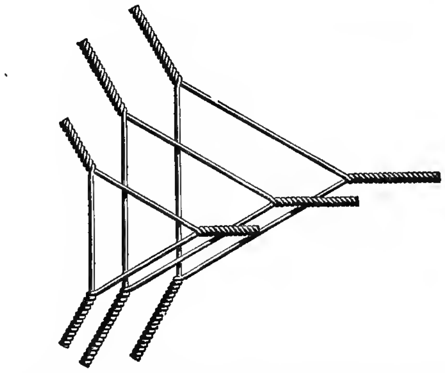
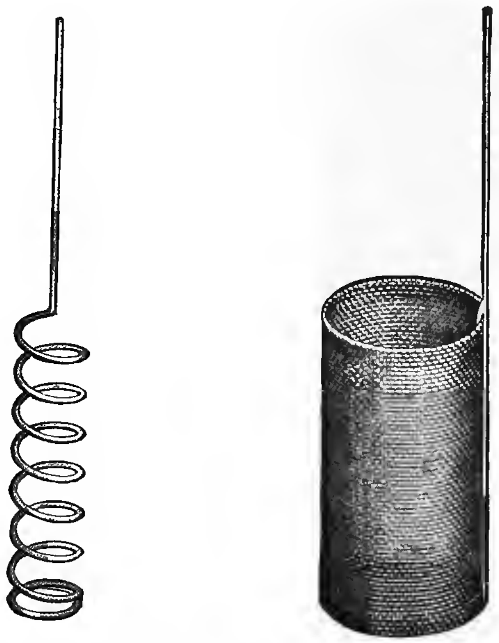


PLATINUM TRIANGLES, TWISTED ENDS



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CHEMICAL DEPARTMENT

17 Battery Place, New York

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Toluol, Pure
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Toluol, Straw Color
Xylol, Pure
Xylol, Commercial
Solvent Naphtha
Crude Solvent Naphtha
Hi-Flash Naphtha
Crude Heavy Solvent Naphtha
No. 10 Naphtha
Heavy Naphtha
Pyridin, Denaturing
Pyridin, Commercial
Paracumaron Resin
Heavy Solvent Oil
Shingle Stain Oil
Special Heavy Oil
Special Heavy Oil, Grade 2
Neutral Hydrocarbon Oil
Creosote Oil
Crude Carbolic Acid, 97-99% Straw Color
Crude Carbolic Acid, 95% Dark
Crude Carbolic Acid, 50% 1st Quality
Crude Carbolic Acid, 25% 1st Quality
Crude Carbolic Acid, 15% 1st Quality
Crude Carbolic Acid, 50-60% 2nd Quality
Crude Carbolic Acid, 25-30% 2nd Quality
Crude Carbolic Acid, 10-15% 2nd Quality
Dip Oil
Phenol, U. S. P., Natural
Phenol, U. S. P., Synthetic
Para-Amidophenol
Cresol, U. S. P.
Refined Cresylic Acid, No. 5
Ortho-Cresol
Para-Cresol
Meta-Cresol
Xylenols
Resorcin, Technical
Resorcinol, U. S. P.
Salicylic Acid, U. S. P.
Sodium Salicylate, U. S. P.
Methyl Salicylate, U. S. P.
Salol, U. S. P.
Salicylimide
Naphthalin, Flake
Naphthalin, Small Balls
Naphthalin, Large Balls
Naphthalin, Crushed
Naphthalin, Powdered
Naphthalin, Granulated
Naphthalin, Rice
Naphthalin, Lump
Naphthalin, One-Ounce Cakes
Naphthalin, Square Tablets
Naphthalin, Round Tablets
Cryst Alba
Nitronaphthalin
Alpha-Naphthylamin
Anthracin (Crude), 25%
Anthracin, 40%
Anthracin, 80%
Carbazol
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Tarola X
Special Cresol Compound
Disinfecting Powder
Disinfectants, Coefficients 2 to 20

E. B. BADGER & SONS COMPANY

BOSTON, MASS., U. S. A.

NEW YORK OFFICE: 101 Park Ave.

PRODUCTS:

Stills for all Purposes. Badger-Barbet Continuous and Discontinuous Vacuum and Pressure Types, of any Metal.

Evaporators for any Purpose. Badger-Webre Types, Copper, Iron, Brass, Lead and Tin-lined or practically any Material.

Digestors and Autoclaves. Rotary and Stationary types, Copper Iron, Silver, Lead and Tin-lined, Etc.

Dryers. Stationary and Rotary.

Homogeneous Tin, Lead and Silver Lined Stills, Kettles, Digestors, and Tanks.

Special Apparatus for Chemical Work, Especially Heavy Copper Equipment.

Engineering services, in Designing Apparatus, Arrangement Plans, Installation and Operation of Apparatus, Complete Plants for many Chemical Products.

BADGER SERVICE:

Badger Service covers laboratories for experimental and research work, engineering staff and drafting department, shop organization and experience permitting us to furnish apparatus of the proper design and best mechanical construction and to deliver same promptly.

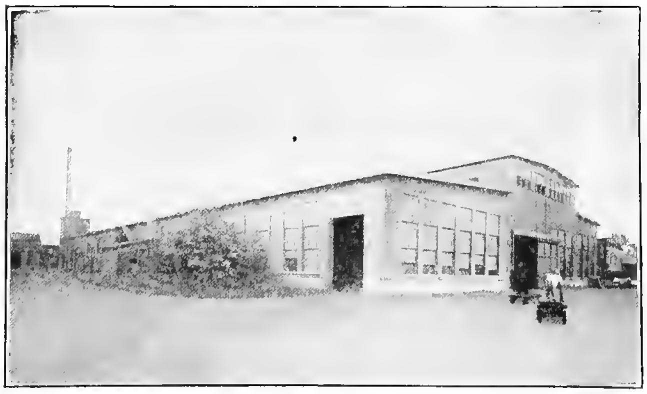
Through this service and experience we are in a position not only to furnish individual apparatus of proper design and construction but to equip complete plants, the units of which are properly co-ordinated, particularly such plants as may involve new problems in design and construction.

Years ago we predicted that the development of the chemical industry of the United States would be dependent as much on the use of the proper machinery as on the employment of the proper reactions and that such machinery could be obtained only from concerns possessing expert knowledge of the use of metals, of mechanical construction and of the fundamental principles of chemical engineering. We have for years, therefore, been developing this **Badger Service** and as a result have been in a position to demonstrate the truth of our assertions many times during the great chemical developments in this country resulting from the war in Europe.

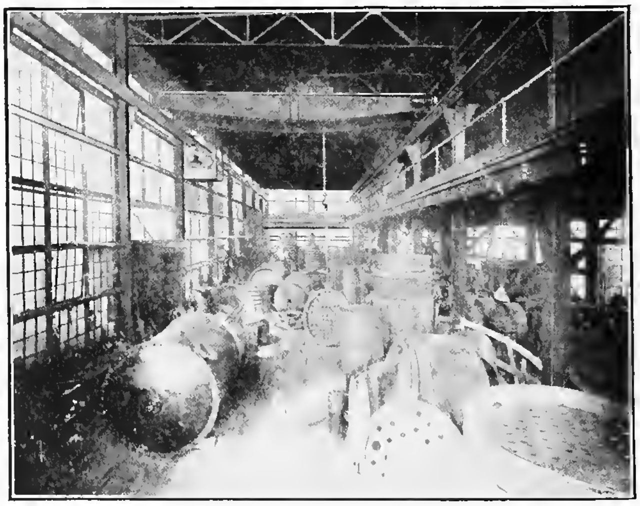
Office and Copper-Shop; Machine Shop for Small Work; Laboratories in Rear.

Many plants have been comparative failures because the owners did not realize that a consulting engineer is often lacking in construction knowledge and that metal workers are lacking in the necessary knowledge of chemical engineering and above all that research is a fundamental requirement in the development of any industry.

Through research and laboratory work we are able to develop chemical processes, to determine the proper general design of equipment and the best materials to use in construction; through our engineering organization in conjunction with shop we are able to co-ordinate the results of experimental work and to determine on the proper design in construction of apparatus; through our shop and business organization we are able to make prompt and reliable shipment of equipment and to handle properly the details involved in construction of complete plants, and in conjunction with laboratories provide facilities for quick completion of experimental equipment; and finally through our engineering organization again, we are in a position to supervise the design of complete plants and to render invaluable



Foundry Where All Our Large Castings Are Made



Interior of Assembly Plant

Continued on Next Page

service required in connection with the development of all new industries, in erection and operation of plant, advice as to purchase of materials and disposal of products, etc. It would be impossible to render this service were any of the essential features of **Badger Service** lacking; it is only by complete co-ordination of the different departments that the best results are obtained.

On the following pages we describe certain equipment which we furnish. It is impossible, of course, to go into specific details or to cover all of our apparatus. We can give detailed information on any of our products on request.

A SPECIFIC CASE WILL ILLUSTRATE HOW BADGER SERVICE IS APPLIED:

Several months ago a very large concern, a competent business organization, decided to undertake the manufacture of a valuable and well known product by a synthetic process not hitherto employed in this country, and nowhere before operated on the enormous scale proposed. They were unable even with the organization available to undertake the design of equipment themselves and came to us. It was first necessary to design and build an experimental plant so constructed that the process could be carried out in a small scale to obtain data essential for the designing of large scale equipment. We designed and constructed the greater part of this apparatus. After completion of experimental work it was necessary to design large scale apparatus and this involved designing of condensers, scrubbers, autoclaves, continuous concentrating stills, discontinuous purifying stills and continuous refining stills, evaporators, preheaters, and miscellaneous equipment, the metals employed in the different equipments being cast iron. steel, copper, lead, duriron, aluminum, and silver.

The proper design of this apparatus required not only a close knowledge of the applications of different metals and general apparatus construction but necessitated complicated calculations involving vapor pressures of materials in vapor state and in solution, relative solubilities, specific heats, heats of vaporization, chemical reactions, etc., of materials not generally handled, as well as a wide knowledge of the behavior of the many materials handled under different conditions.

In addition to the construction of equipment after designing same, it was necessary for us to make general plans of building, advise as to the arrangement of the same, planning on general arrangement of storage tanks and arrangement of steam, water and liquor piping as well as to serve in consulting capacity on many other questions involved in the construction of a plant such as this. We were not only in a position to do the designing and construction work specified above but to deliver this, erecting the apparatus on the grounds and to furnish engineers to supervise the operation of the particular units.

Assembly Plant and Machine Shop for Heavy Work.

Benzol Plant, Terre Haute, Ind.

This is an example of **Complete Service** which is very difficult to obtain and is only one of the many which we might enumerate, involving different propositions and different equipments.

COMPLETE PLANTS:

We are in a position to furnish complete installations as well as special apparatus and machines for manufacturing, producing or extracting:

- Acetate of Lime
- Acetic Acid
- Acetone
- Amyl Acetate
- Benzol
- Dyewood Extracts
- Ethyl Alcohol
- Ethyl Ether
- Fatty Acids
- Formaldehyde
- Glycerine
- Glue
- Lactic Acid
- Salicylic Acid
- Wood Alcohol

We equip and operate complete plants for the distillation of hard and resinous woods and for the production of alcohol from molasses or grain, from raw material or finished products.

The products mentioned above are those whose production or handling require more particularly the special forms of apparatus such as we manufacture ourselves. As we have previously stated, however, our organization and connections are such that we are able to advise as to the equipment of plants for practically any chemical process, to purchase this equipment if desired and to render the same general service as any well equipped engineering firm with the additional advantage of far more complete organization in every respect than is possessed by many such engineering concerns and with the extended experience behind us which comes from work which we do in so many varied lines.

STILLS.

GENERAL:

We manufacture Stills for practically every commercial volatile product. These stills, according to the material handled are of different types such as—Continuous, Discontinuous, Pressure and Vacuum, etc., and are constructed of copper, cast iron, steel, aluminium, etc., according to the chemical action.

Our main object is to furnish the most efficient still possible for the purpose, and to give an apparatus which can be easily operated, which will be durable and give the highest grade of product possible.

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MATERIALS HANDLED:

We have furnished during the past year installations handling more than 30 different products, such as Benzol, Acetone, Phenol, Ammonia, Aniline Oil, Ether, Carbon, Tetrachloride, Chlorbenzol, Chlorethane, Sulphur Chloride, Methyl Alcohol, Acetic Acid, Ethyl Alcohol, Acetaldehyde, Fusel Oil, Toluol, Amyl Acetate, Salicylic Acid, Ethyl Nitrite, etc.

If the material is handled commercially, we can surely furnish apparatus for distilling; if not, we will undertake to design special apparatus.

EXPERIENCE:

The Barbet Stills which we construct in the United States are of the design of E. Barbet et Fils et Cie, Paris, France, the largest builders of Distilling Machinery in the World, and the first practical builders of Continuous Stills. They now have about 800 installations in 30 countries of the World, and we have the benefit of their experience, as well as our own.

BADGER Stills are of our own design to some extent, and are modelled on the principals of the Barbet Stills.

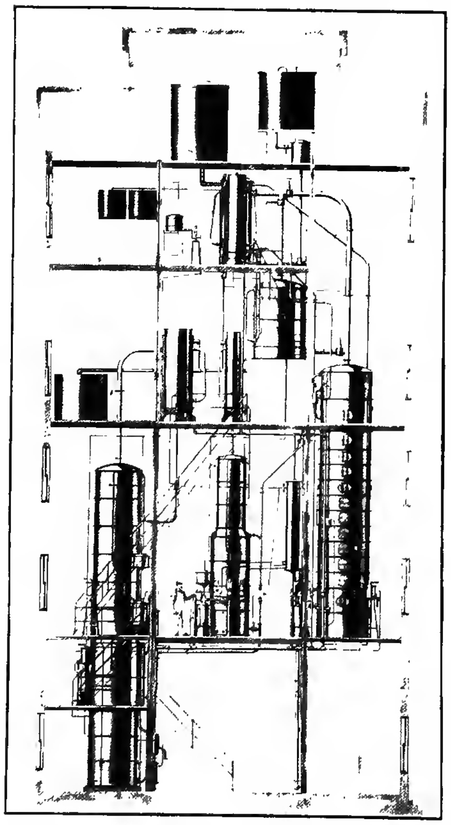
We have had experience in the building of distilling apparatus for more than 60 years, when the first simple forms of apparatus were installed in the United States.

IMPORTANCE OF PROPER MACHINERY:

There are few industries where problems involving distillation do not arise. We are safe in saying that more mistakes are made in the installation of improper apparatus of this type than in any other line of Chemical Equipment.

Usually Stills are employed in the final refining of a manufactured product, and the standard of quality is dependent upon the type of Still employed. We have known of many plants possessing very costly machinery for the production of a crude material, who put out a low grade product simply because they have economized in the purchase of Distilling Apparatus, which is often a small item in the total equipment.

We will not make this statement general, but refer to specific cases where low grades of product such as Benzol, Acetone, Methyl Alcohol, Phenol, Aniline, Turpentine, Ethyl Alcohol, Toluol, Chlorbenzol, were put on the market, and the reputation of the concerns in question were jeopardized, merely on account of the type of Distilling Apparatus which they employed. It is of course, not always a question of expense, for the better apparatus may be the cheaper.



CONTINUOUS STILLS:

We have referred to Stills of two general types—Continuous and Discontinuous.

Continuous Stills can be employed to solve almost any Distilling problem, with in most cases, enormous savings. They have revolutionized the distillation of Ethyl and Methyl Alcohol throughout the World.

While these Stills are new to the United States, their advantages are rapidly being recognized, as the hitherto wasteful Chemical Industry appreciates their economy. Their advantages where they can be employed lie in economy in steam and water, less loss in distillation, more uniform grades of product, less labor in handling, and often lower first cost, and finally, higher grades of product.

We would refer to the advantages of Continuous Distillation in handling the following materials:

ETHYL ALCOHOL:

The distillation of Ethyl Alcohol in the United States was, up to recently, accomplished with a combination of so-called "Beer" Still and Discontinuous Rectifying Still. This necessitated producing first a Crude Product and then refining same with a great deal of handling of Crude and intermediate products.

Continuous Stills now perfected, and installed by us, and by the Barbet Company, will produce the highest grade of refined alcohol exceeding that produced in any ordinary plant, with less than one-half the fuel expense of the old system, with a much lower loss of product, less labor, less danger from fire loss, and with the possibility of producing a refined product within a few hours after starting operation, as compared with 3 to 4 days under the old system.

METHYL ALCOHOL:

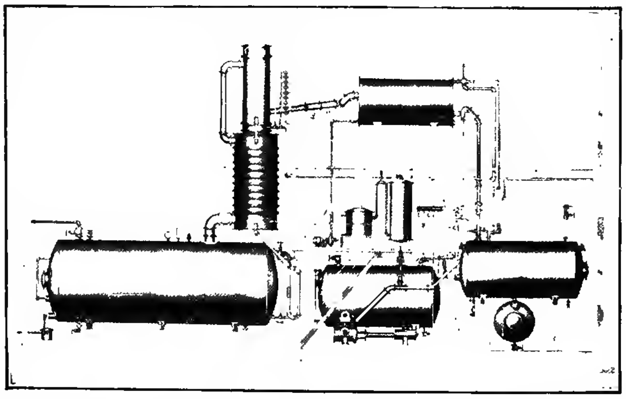
The production of refined Methyl Alcohol was up to within a few years, reserved for large producers of Crude, or for central refineries obtaining crude from many plants. This was due to the fact that the system of Discontinuous refining employed could not be operated practicably on a small scale, and the initial cost of plant for small installations was out of all proportion to the returns.

The introduction of Continuous Stills, of which we have made many installations recently, permit the refining on a small, as well as a large scale, with enormous savings in steam and water, as well as in loss of product, and the installation is no more expensive than those of the old type. Not only this, but the use of Continuous Stills permits the production of a large proportion of the Alcohol in the form of high grade product required for Formaldehyde, Dye Work, etc., where with the Discontinuous System, a very small proportion only of the Alcohol is obtained in this form. These Stills are perfected.

ACETONE:

The refining of Acetone compares closely with the refining of Methyl Alcohol, and the same types of equipment are applicable. The production of the grade of Acetone required for smokeless powder work necessitates the use of Continuous Stills, or very high costs of operation and loss of product with the Discontinuous system.

We have constructed during the past year Units with an aggregate capacity of practically 8000 gallons per day refined Acetone, meeting all British Admiralty tests and operating with great economy.



We cannot discuss all of these particular applications of Continuous Apparatus here, but on request will furnish detailed information as to the application of Continuous Stills to the handling of any material.

DISCONTINUOUS STILLS:

Discontinuous Stills are more applicable to the handling of some products than Continuous Stills.

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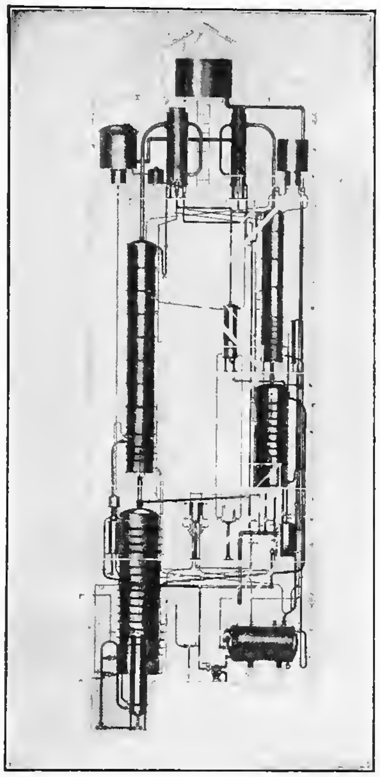
We have developed many types of Discontinuous Apparatus, each of which comprises particular features peculiar to the BADGER systems.

We have made many installations during the past year, which have been of vital importance to the success of the plant in question. It is a relatively simple matter to construct a Still which will handle a product such as Alcohol, but the construction of a Unit to handle even this product efficiently, or to handle such products as Phenol Chlorine products, Acetic Acid, Salicylic Acid, Ether, Benzol, Fatty Acids, is an entirely different matter. Some of our special designs are handling the following materials:



BENZOL:

We have developed special Units for Benzol and Toluol work, of cast iron construction with automatic flow and pressure regulation which are particularly adapted to the handling of a mixture of volatile products, each of which must be obtained in a pure form.

Our Benzol Stills differ materially in type from Units for handling other materials. We have in operation more than 60 Benzol Stills.

PHENOL:

Any cast iron Still will produce Phenol, but safety, economy, and above all, quality, require carefully designed apparatus.

We have installations in operation which have an aggregate capacity of more than 150,000 pounds of pure Phenol per day. These Stills have very special features and Plants equipped with our apparatus have set a standard of quality in this material. A poor Still means a poor product, no matter how expensive the rest of the plant may be.

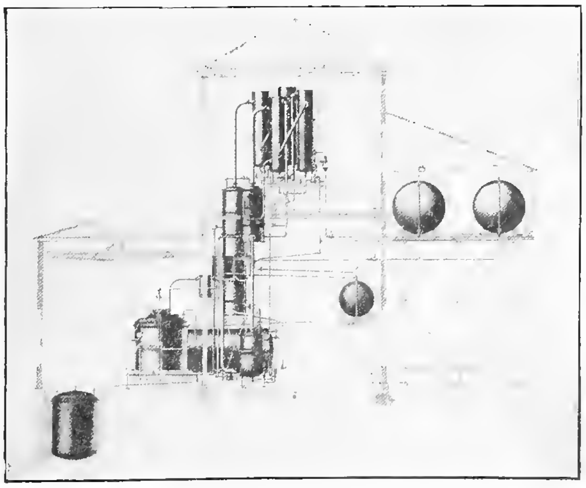
ANILINE OIL:

We construct Aniline Oil Stills of types similar to our Phenol Stills which produce grades of product far better than those manufactured by plants of the old style of equipment. A good still is essential to this work, but many concerns do not yet realize it.

ACETIC ACID:

The construction of Acetic Acid Stills requires not only special knowledge of design, but expert knowledge of heavy copper and aluminum construction.

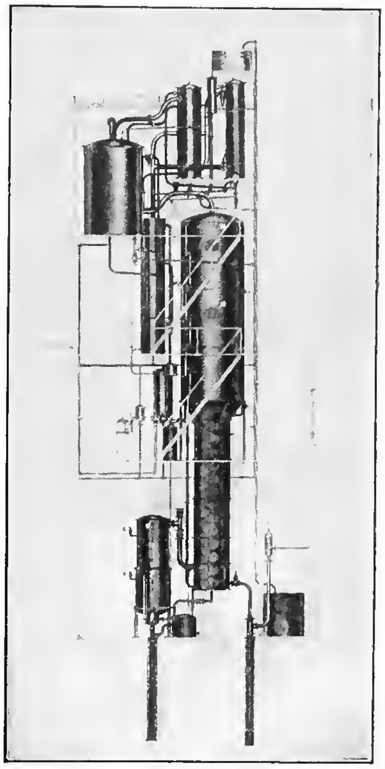
We construct complete Stills in our own shop, and have had many years experience in this line. Our Apparatus has improvements over the German types formerly imported by manufacturers of this product.



BADGER SERVICE IN STILL CONSTRUCTION:

Outside of the general design of Stills as concerns particularly the arrangement and proportion of the parts, BADGER Stills possess special features, such as perforated Boiling Cap construction, liquid flow and feed regulators, pressure regulators, etc., possessed by no other apparatus.

We construct practically all our apparatus in our own shops with expert workmen, and under the supervision of men who have been in the metal working business for 50 years.



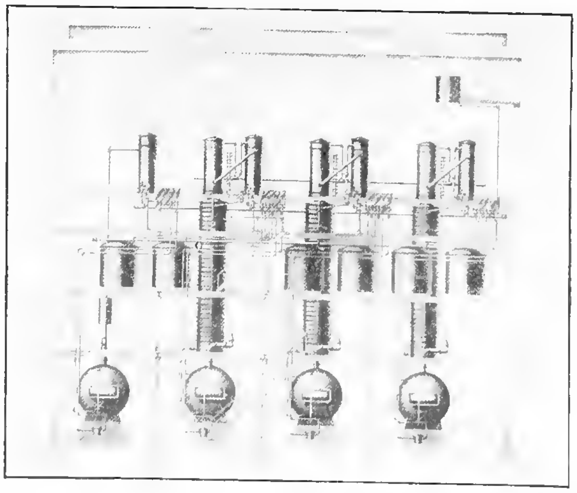
SALICYLIC ACID:

The special design of Still with special lining required for handling this valuable product is right in our line. Equipment which we have furnished and have in successful operation, involves features which only long experience in design and construction has enabled us to work out.

ETHER:

We are Constructers of probably 95% of the Ether Stills required for smokeless powder work in the United States and Canada. A total capacity of these Units is in excess of 750,000 pounds per day. We have developed special type of Stills for this work and the number of installations testifies to their operation.

We have constructed Stills during the past year of cast iron and steel, copper and aluminum, lead and silver lined, etc. On account of large amount of work which we have done, we have plans and patterns covering practically any size and design of apparatus and we therefore specialize in making prompt and quick shipments.



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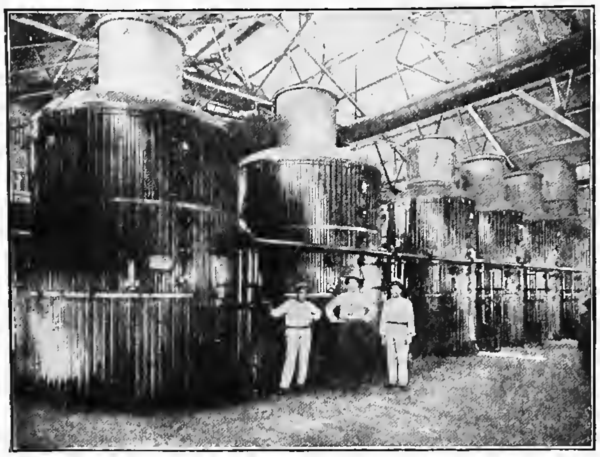
EVAPORATORS.

GENERAL:

We build Evaporators of Badger and Webre types of copper, iron, brass, hard lead or lead-lined, etc., and of type required by material to be handled.



Webre Evaporator Sextuple Effect

MATERIALS HANDLED:

We build evaporators of any size and for any material, such as

Sugar
Salt
Glycerine
Potash
Tanning extracts
Dye-wood extracts
Sulphates
Caustic soda
Sodium
Benzo-Sulphonate
Ammonium Phosphate
Urea
Water

Tomato Pulp
Glucose
Glue
Gelatine
Black Liquor
Sulphite Waste
Calcium and Magnesium Chlorides
Pyroligneous Acid
Calcium Acetate
Sodium and Potassium Nitrates
Mercerizing Liquors
Garbage Water
Distillery Waste, etc.

TYPES OF APPARATUS:

We build evaporators of any type, for pressure, vacuum, high pressure and exhaust steam, and for foaming, crystallizing, precipitating and high density liquors. We **specialize** in construction of evaporators for particular work, the more difficult the problem, the better, and build machines of FILM, BASKET, HORIZONTAL and VERTICAL TUBE TYPES to suit. In most cases, however, we can adapt, with suitable modification, and get best results by using

THE STANDARD WEBRE EVAPORATOR:

More than a year ago we announced the fact that we had obtained exclusive rights to the manufacture of the patented WEBRE EVAPORATOR which had been giving phenomenal results in many installations. Since that time installations handling many materials have proved that this machine offers a combination of valuable features which will mean its very extensive adoption.

The WEBRE EVAPORATOR even of ordinary standard type has solved concentration problems which practically no other machine could touch. The position which the WEBRE EVAPORATOR holds is indicated by its adoption in several of the largest and most modern sugar plants in Cuba. The sugar industry offers the largest field for evaporator work in the world and the material is one of the most difficult to handle, particularly in view of the peculiar operating conditions which necessitate the use of a machine which will operate throughout the grinding season with practically no time allowable for shut-downs for cleaning or repairs. A machine adopted as a standard in this industry, where evaporation is such an all-important part of the process, must be the best.

Within the past month another well-known plantation in Porto Rico, frequently referred to as possessing the most efficient equipment, placed order for a very large WEBRE EVAPORATOR after very careful study of all of its features.

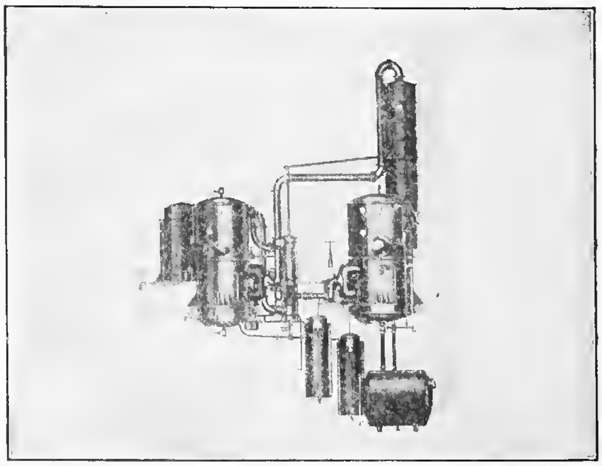
IMPORTANT FEATURES:

The special features of the WEBRE design are the following:

Simple construction.
Thorough removal of non-condensible and corrosive gases.
Ease of cleaning.
Exact and efficient level control.
Fast and uniform circulation.
Reversible liquor and vapor flow where required.
High efficiency of heating service permitting operation with low temperature drop.
No moving parts.
Small volume liquor in transit.
No mechanical circulation.

Many of these features are, of course, inherent to the design of many other types of evaporators, but the WEBRE EVAPORATOR offers a construction permitting a combination of all the above valuable points in one machine.

The removal of non-condensible and corrosive gases is a particularly valuable feature and a point of advantage obtained with few commercial types of apparatus, most of those possessing this feature offsetting its benefits to a certain extent by the complicated construction necessitated to obtain it. In the WEBRE EVAPORATOR the removal of gases is accomplished in a simple manner thoroughly covered by numerous patents. The removal of gases not only prevents the formation of gas films on the heating surface, causing the evaporator to become to a certain extent air bound and decreasing the rate of evaporation per square foot of surface, but it serves in many cases to remove gases which accumulate and corrode the heating tubes and thereby give a longer life to the machine. Again



Acetate Still and Evaporator

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the removal of gases permits the adaptation of this evaporator to certain work, such, for instance, as the distillation of lime-lee liquor and acid-liquor in wood distillation plants where the non-removal of the wood alcohol vapors practically prevents the efficient use of very economical equipment. Another great advantage of gas removal lies in the fact that through such removal, the efficiency of the heating surface is increased to such a point that with a certain temperature drop the maximum number of effects can be employed. For instance, operating with an initial steam pressure of five pounds and a vacuum of 24 inches it had been considered in the sugar industry that four effects were all that could be economically employed since the heating surface was increased out of all proportion to capacity when a greater number of effects were used. This was due to the fact that of the total temperature drop through each effect a large proportion was utilized in overcoming constant losses such as that caused by the formation of gas films. This constant loss was of such magnitude that the effective drop was reduced to practically nothing when using, say, six effects. Eliminating the constant loss due to the gas accumulation has permitted the use of six effects with, of course, an enormous economy since the amount of steam required for a certain amount of evaporation is only roughly two-thirds of that required with a quadruple effect. What this may mean on a large sugar plantation can be realized. We quote from letter referring to the installation of the first sextuple effect in Cuba.

"The first Sextuple Effect in the Cuban sugar industry is a WEBRE EVAPORATOR put into successful operation in this campaign of 1915-16. This equipment was supplied for Messrs. Smith, Ames & Chisholm, Consulting Engineers, Havana and New York, for Central Violet, this factory being conceded as representative of the most modern practice. In this case an additional saving of about 500 horsepower is effected by heating the raw juices from the mill on their way to the defecators to ebullition by means of vapors from the second body used with the heaters in the foreground, the initial steam pressure never exceeding 8 pounds in the first body."

The other features of the WEBRE EVAPORATOR are in many cases just as important, but the most important thing to remember is that each installation requires thorough and careful planning, such as only extended experience will allow.

USE OF EXHAUST STEAM:

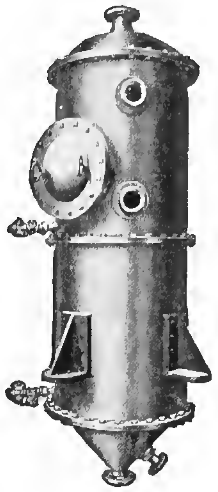
We would call particular attention to the advantages of the WEBRE EVAPORATOR when operating with exhaust steam, such as must be employed to greatest advantage in practically all commercial installations.

REMODELLING TO WEBRE SYSTEM:

Many types of existing installations can be remodeled to the Webre System at small expense, with the result of increasing the capacity up to 50%.

EFFICIENCY:

We would refer to article entitled "Capacity and Economy of Multiple Effect Evaporators" by Prof. E. W. Kerr, published in issue of May 15th, 1916, "Metallurgical & Chemical Engineering." This article which covers the results of tests over a period of several years on many large scale installations of standard evaporators of various types shows conclusively that the WEBRE EVAPORATOR is as efficient, if not more so, than any other type of commercial machine. Its efficiency is far greater than that of machines of relatively simple type of construction with which it is compared, and as good as that of the types involving complicated construction, whose object is efficiency without special regard to simplicity of construction.



TIN-LINED EVAPORATOR

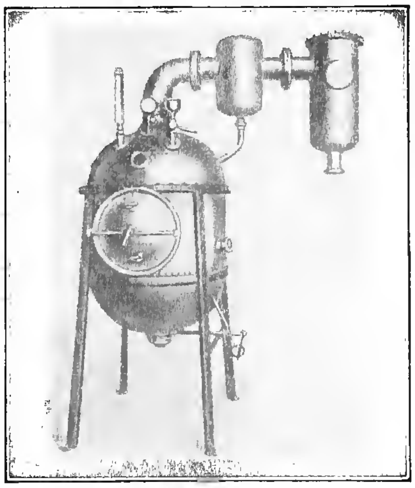
VACUUM PANS:

We make a specialty of the manufacture of Vacuum Pans of iron, copper, lead, silver or tin-lined, copper or steel.

These pans may be fitted with our special manholes, foot valves, sightglasses, thermometer and liquor testing attachments, catch-all, spray or surface condensers and vacuum pumps and are especially designed for handling milk, dyes, tanning, fruit and medicinal extracts, confectionery, etc.

We have recently made installations of special tin-lined vacuum pans for the concentration of urea. We have designed special equipments for the recovery of distilled solvents which have great advantages over equipment previously employed.

They are built in any capacity from 25 to 1500 gallons or larger.



Vacuum Pan

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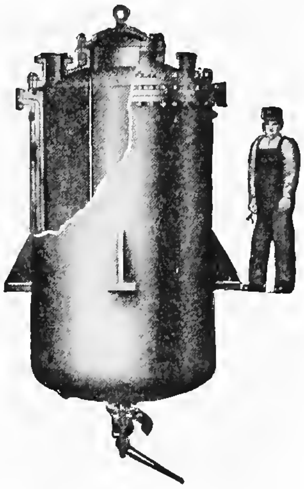
AUTOCLAVES AND DIGESTORS:

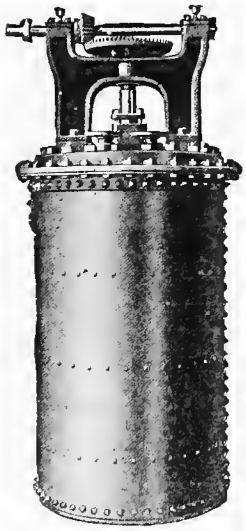
We make a specialty of the manufacture of heavy copper or lead-lined digestors or Autoclaves, diffusion batteries, etc.

At the present time the Auto-Saponification of fats for the production of high grade glycerine and fatty acids for distillation is attracting considerable attention in this country and we are equipped to furnish the necessary equipment complete.

The extraction of tanning extracts under pressure is another field in which there will be great improvements. We construct diffusion batteries of most efficient types for this work.

The production of many dyes and synthetic products requires the use of Autoclaves of steel and copper, and lead and silver lined, sometimes for very high pressures. Our long experience in this line, which necessitates expert knowledge, careful construction, and the best of material, together with our patented lining processes, fit us particularly for this work.


Silver-Lined Digestor


Lead-Lined Autoclave

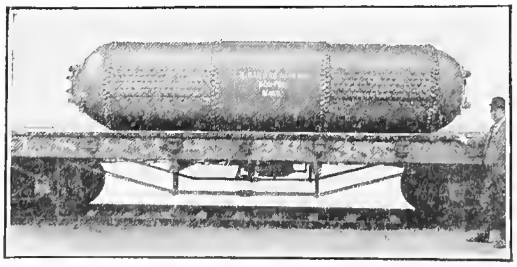
EXTRACTORS:

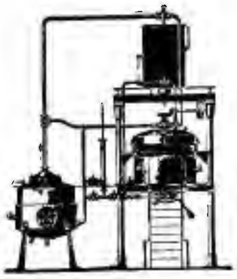
Our Extracting Apparatus is applicable to the removal and recovery of fats, oils, gums, resins, etc., and to the purification of oily and greasy residues.

The production of some Synthetic products requires the extraction of materials from solutions by the use of immiscible solvents. We have devised special apparatus for this work.

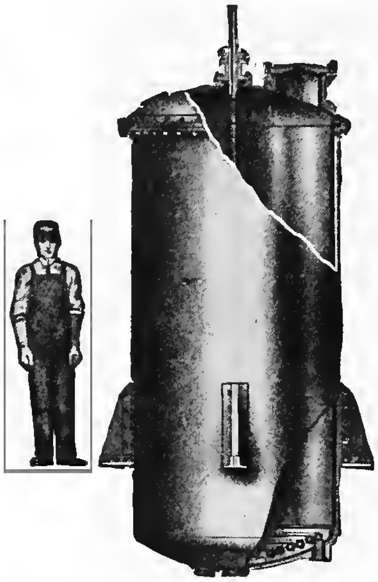
We furnish not only the extraction apparatus but the solvent recovery apparatus as well.

Extraction apparatus must be designed for simplicity and low cost of operation, for minimum loss of solvent, in both the extracted material and residue, complete extraction, safety from fire when using inflammable solvents, etc.


Copper Digestor


Extractor

We have had the experience to enable us to solve any problem in this line. We have recently designed plant for recovery of a material formerly burned which is worth, when recovered, $40,000 per year, where our special design only made the recovery feasible.

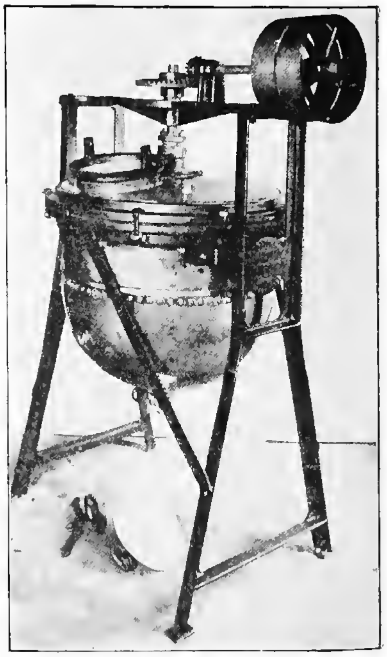

Lead-Lined Digestor

HOMOGENEOUS SILVER AND LEAD-LINED COPPER AND STEEL APPARATUS:

For many years we have been successful manufacturers of homogeneous silver and lead-lined copper and steel apparatus. We have recently developed a process of homogeneous tin lining which has proven very satisfactory.

We have found that many concerns have uses for equipment of this nature, but are not aware that the same is manufactured in this country. The equipment indicated on cuts herewith has been manufactured by us recently. Other installations made during the past year cover lead-lined kettles, stills and digestors, silver-lined kettles and autoclaves, tin-lined stills, kettles, evaporators, tin-covered coils, etc.

So far as we know, no other concern possesses the facilities for manufacturing this type of equipment, nor the expert workmen required to carry out the work.


Tin-Lined Kettle

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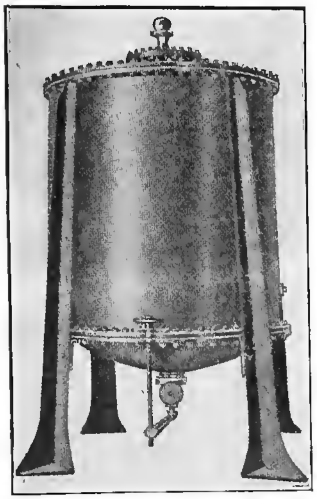
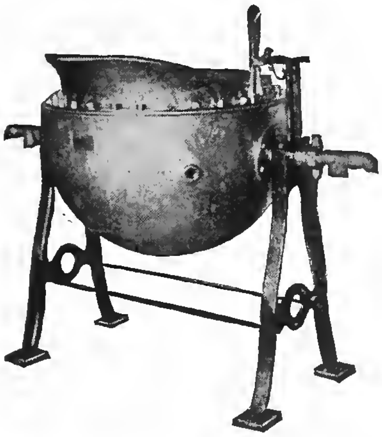
SPECIAL APPARATUS:

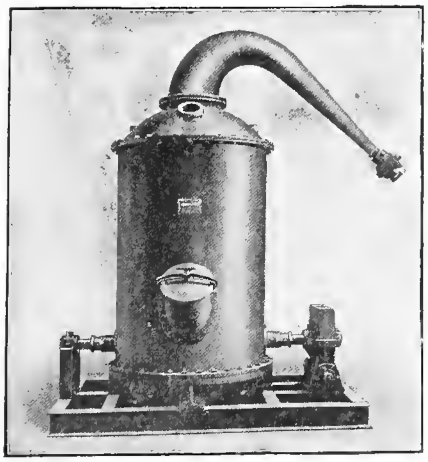
It is often necessary to construct special equipment some of which we refer to in previous paragraphs, where we are referring particularly to the lining process itself. Such equipment comprises, for instance, Scrubbers, Mixing Stills, drying equipment, etc. We have solved a great many problems involving such apparatus.

We might refer to our silver-lined digestors, copper-lined autoclaves, tin-lined evaporators, apparatus for ether extraction from water solutions, lead-lined steam jacketed scrubbing towers, etc., as examples of such special equipment. Problems of this kind involve careful and expert design and chemical engineering experience, as well as most expert construction.

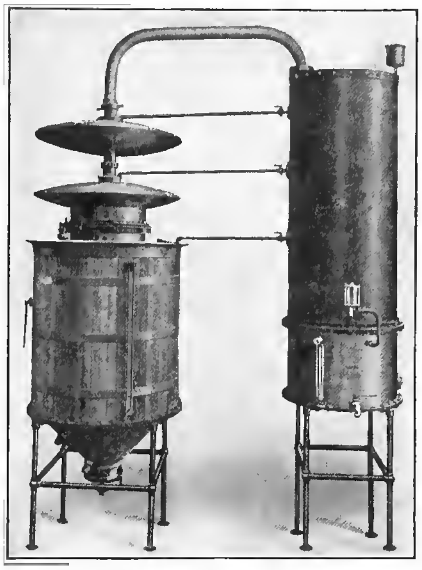




Silver-Lined Jacketed Kettle



Steam-Jacketed Mixing Still



Special Still

LIST OF CUSTOMERS:

GENERAL CHEMICALS

Solvay Process Company
Semet-Solvay Company
Pennsylvania Salt Mfg. Co.
Dow Chemical Company
Merrimac Chemical Company
Naugatuck Chemical Company
Essex Glue & Gelatine Co.
Tennessee Copper Company
Roessler & Hasslacher Chemical Co.
Hooker Electrochemical Co.

SYNTHETIC CHEMICALS

American Synthetic Dyes, Incorp.
New England Mfg. Co.
Newport Hydrocarbon Company
Canadian Electro Products Company
Aetna Chemical Company
Organic Salt & Acid Company
Semet-Solvay Company
American Aniline Chemical Co.
American Cyanamid Company
Ammo-Phos Corporation

CELLULOSE PRODUCTS

E. I. Du Pont de Nemours & Co.
Tionesta Valley Chemical Co.
The Celluloid Company
The Arlington Company
Melville-Corbett Company
Delta Chemical Company
Hercules Powder Company
Aetna Explosives Company
Burgess Sulphite Fibre Company
Eastman Kodak Company

DISTILLING AND BREWING

Jefferson Distilling & Denaturing Co.
Purity Distilling Company
Felton & Sons
Chapin, Trull & Co.
Daniel E. Chase & Co.
Starr Brewing Company
Consumers' Brewing Company
Everett Distilling Company
Solvents Recovery Company
Southern States Alcohol Mfg. Co.

COAL TAR PRODUCTS

Indiana Coke & Gas Company
Newport Mining Company
Cambria Steel Company
Dominion Iron & Steel Company
Toronto Chemical Company
Woodward Iron Company
Thomas A. Edison
Zenith Furnace Company
New England Manufacturing Co.
Bayway Chemical Company

DRUGS AND MEDICINES

American Camphor Company
United Drug Company
Moxie Company
United Perfume Company
Angier Chemical Company
Potter Drug & Chemical Company
Lydia Pinkham Medicine Company
Mellin's Food
Charles Pfizer & Co.
Bayer Chemical Co.

RUBBER, OILS AND PAINTS

Hood Rubber Company
India Rubber Company
Goodyear Metallic Rubber Shoe Co.
Boston Rubber Shoe Company
Sherwin-Williams Company
Texas Company
Standard Oil Company
Gulf Refining Company
Revere Rubber Company
Southern Cotton Oil Company

SUGAR, SOAP, STARCH AND SALT

American Beet Sugar Company
Armour & Company
Revere Sugar Refining Company
Atlantic Sugar Refineries, Ltd.
Guanica Centrale
National Starch Company
Will & Baumer
Holley Sugar Company
American Sugar Refining Co.
Virginia Products Company

MACHINERY

Tennessee Copper, Iron & Railroad Co.
Westinghouse Electric & Mfg. Co.
Fore River Ship Building Company
Waltham Watch Company
Stone & Webster Engineering Corporation
General Electric Company
American Tin Company
United Shoe Machinery Company
Metropolitan Water Board
New York Steam Company

TEXTILE MANUFACTURE

Cheney Brothers
Salts Textile Company
American Woolen Company
American Silk Company
Draper Brothers Company
Philadelphia Tapestry Mill
Champlain Silk Mills
Windsor Print Works
Hampton Thread Company
Milford Dye & Bleachery Works

THE BARTLETT HAYWARD CO.

Founders and Engineers

BALTIMORE

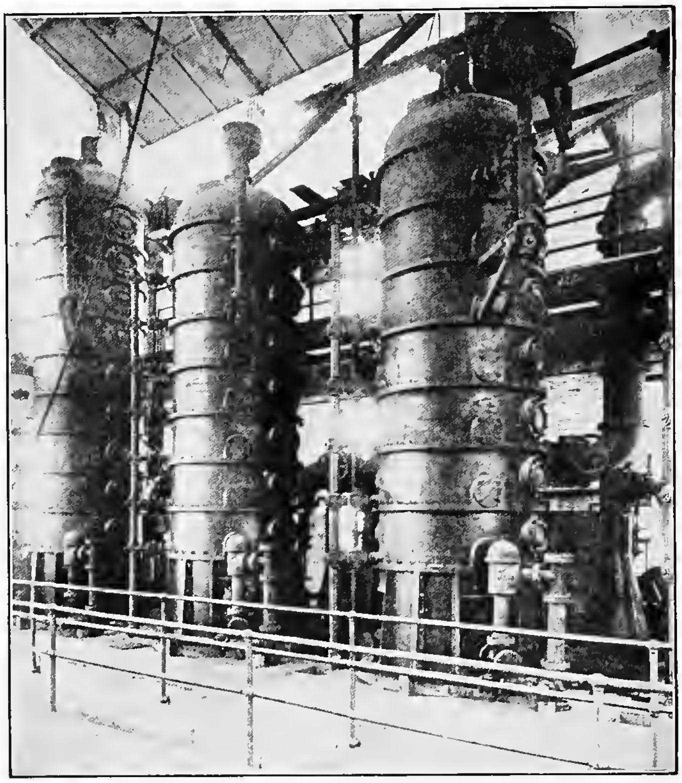
NEW YORK

WORKS AT BALTIMORE, MD.

PRODUCTS: Complete Coal and Water Gas Plants; Gas Holders and Steel Tanks; Coal Gas By-Product Plants; Concentrated Ammonia, Aqua Ammonia and Ammonium Sulphate Plants; Apparatus for the Production of Ammonium Sulphate without the use of Sulphuric Acid; Vertical Centrifugal Washers for the Cleaning of Gas; Blast Furnace Gas Cleaning Plants; Apparatus for Fractionating Tar; Benzol Extraction and Purifying Plants; Cyanogen Extraction Plants; Apparatus for the Manufacture of Potassium Ferrocyanide and Sodium Ferrocyanide; Gas Purifiers, Condensers, Scrubbers and Tar Extractors; Coke Screening Plants; Hot Coke Conveyors; Apparatus for the Manufacture of Cane and Beet Sugar.

VERTICAL CENTRIFUGAL GAS WASHERS:

These Washers are built in sizes having capacities of from 250,000 to 45,000,000 cubic feet of gas per diem, operating under a maximum of one inch back pressure.



CYANOGEN, SULPHUR, AND AMMONIA WASHERS

TABLE SHOWING VARIOUS CLASSES OF WORK HANDLED BY WASHERS

Duty	Washers	Cu. ft. Capacity per day
Dust Extraction	13	322,125,000
Recovery of Pitch, Oil and Tar	19	151,824,000
Extraction of Naphthalene	16	63,700,000
Cyanogen Extraction	10	34,300,000
Ammonia Extraction	81	279,500,000
Benzol Extraction	3	15,000,000
Recovery of By-Products from Peat	7	29,750,000
Direct Production of Ammonium Sulphate	11	40,150,000

BAUSCH & LOMB OPTICAL CO.

ROCHESTER, N. Y.

NEW YORK
200 Fifth Ave.

WASHINGTON
613 Fifteenth St. N. W.

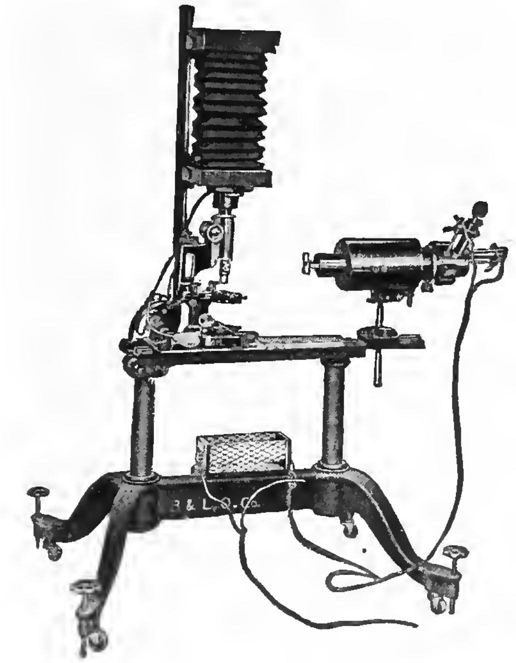
CHICAGO
122 S. Michigan Blvd.

SAN FRANCISCO
154 Sutter St.

LONDON, E. C.
37-38 Hatton Garden

FRANKFORT a/M.
Schillerstrasse, 31

PRODUCTS: Microscopes of all kinds; Microtomes; Photomicrographic and Projection Apparatus; Photographic Lenses; Chemicals; Glassware; Optical and Laboratory Equipment.



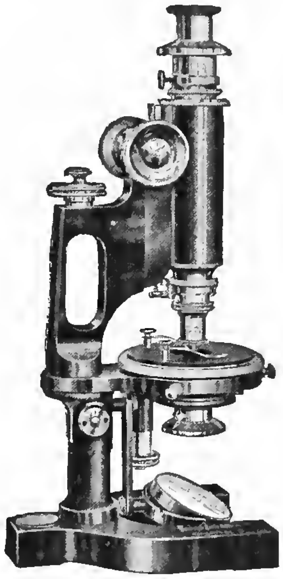
PHOTOMICROGRAPHIC APPARATUS FOR METALLOGRAPHIC WORK:

We manufacture a number of photomicrographic cameras, designed to meet every need in a most convenient and efficient manner.

The outfit shown here has two optical beds carried on a single stand of convenient height for operation and observation of the ground glass. The lamp adjustments are easily reached from the microscope or the camera. The latter has 4 x 5-inch double plate-holder with reducing kits and an automatic shutter. Price, with 4½-ampere rheostat, $155.00.

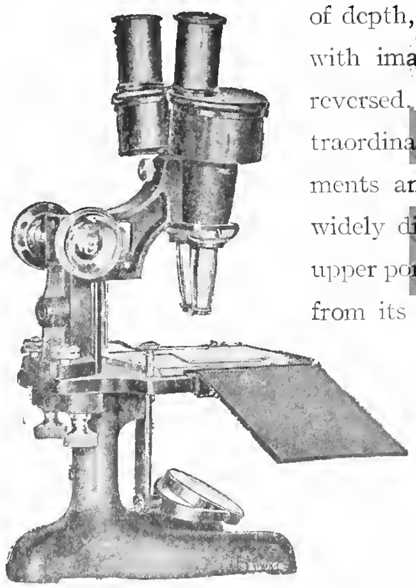
Metallurgical Microscope CCM (shown with camera) with 16 and 4 mm. objectives, 5× eyepiece, vertical illuminator, $112.50.

CHEMICAL MICROSCOPE M:



Revolving stage graduated in single degrees and provided with centering screws. Analyzer and polarizer, each with 2-degree graduations. Lever fine focusing adjustment. Price with 16 and 8 mm. objectives fitting quick-changing nosepiece, 10× and 12.5× eyepieces, $90.65; with 32, 16 and 8 mm. objectives fitting quick-changing nosepiece, 5×, 7.5×, 10× and 12.5× eyepieces, $100.00.

BINOCULAR MICROSCOPE KA:



This microscope gives proper perspective, perception of depth, form and solidity with image erect and unreversed. Possesses an extraordinary range of adjustments and adaptability to widely different uses. The upper portion may be taken from its base for examination of large pieces of wood, leather, etc. Price, with 40 mm. objectives and 10× eyepieces, $60.00.

Write for Catalog AD, "Optical Instruments for Inspection and Testing of Materials."

WRITE FOR COMPLETE CATALOGS OR OTHER INFORMATION.

CHRISTIAN BECKER, Inc.

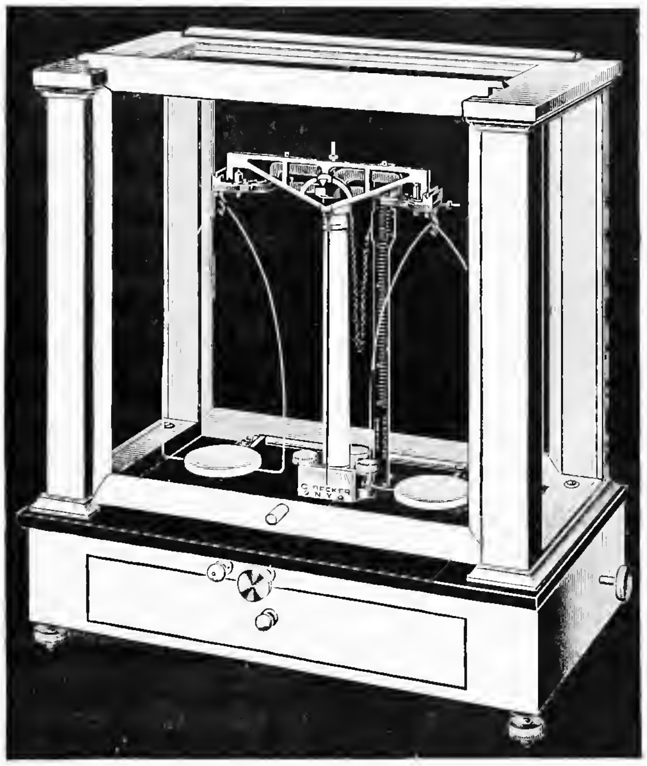
ESTABLISHED 1836

92 Reade Street
NEW YORK

CHAINOMATIC
TRADE MARK

Factory
147-9 Eighth St., Jersey City, N. J.

PRODUCTS: Balances and Weights of Precision.

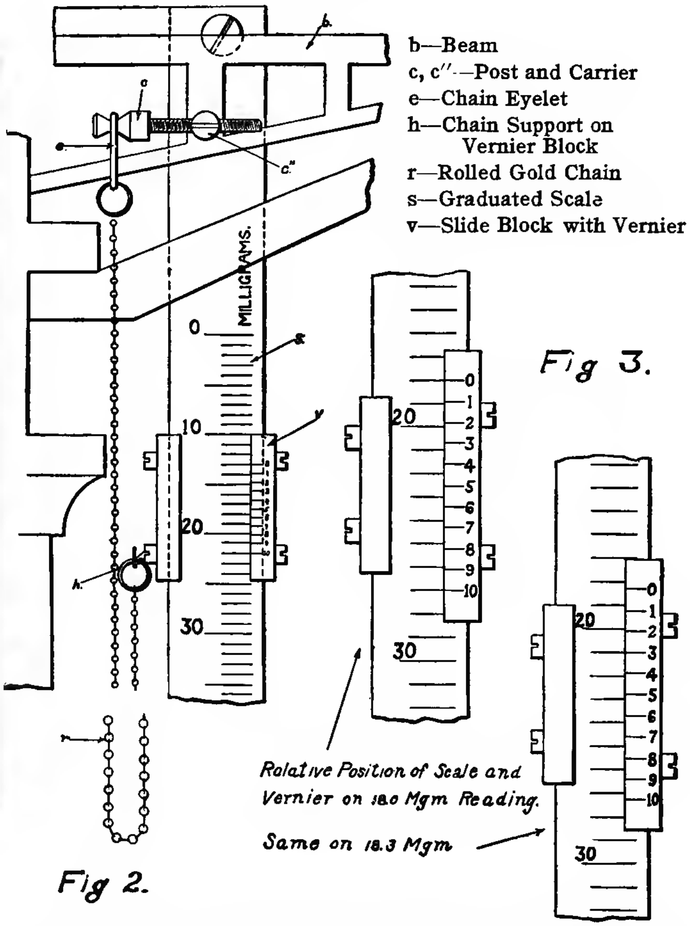


Analytical Chainomatic Balance No. 8-A

"CHAINOMATIC" BALANCES AND WEIGHTS OF PRECISION:

The Chainomatic balance is of the usual construction of the analytical or laboratory balances as far as knife edges, bearings, etc., are concerned, with the exception that there is no rider and consequently no graduations on the beam. One end of the weighing chain is hung from an arm of the scale beam, and the other end from a slide-block which is moved up and down on a vertical graduated scale. As this block is raised, more of the weight of the chain is taken from the beam and hangs from the slide-block which forms a stationary support for holding the inactive part of the chain. As the slide is lowered a greater proportion of the weight of the chain is transferred to the beam.

To read the effective weight of the chain the vertical guide is provided with graduations according to any desired denominations representing, for instance, milligrams, so that when the zero mark on the slide registers with any of these graduations the weight of the object being weighed may be directly read off. For finer readings this construction lends itself readily to the application of the vernier. For this purpose both the slide-block as well as the vertical scale are graduated, their respective graduations differing by one unit, that is to say, for 10 graduations on the guide there will be 9 on the slide; consequently each of the vernier divisions is read as $\frac{1}{10}$ of a milligram (see Fig. 2). The links of the gold-filled chain are practically all uniform in weight, hence the graduations are uniformly spaced.



b—Beam
c, c"—Post and Carrier
e—Chain Eyelet
h—Chain Support on Vernier Block
r—Rolled Gold Chain
s—Graduated Scale
v—Slide Block with Vernier

Fig 2.

Fig 3.

Elevation of Portion of Beam, Right Side, Showing Method of Attachment and Line of Movement of Chain and Vernier Block.

A thumb-wheel is provided at the right-hand of the base of the case. This manipulates the spiral drive—the feature which has made this invention practical. By turning the thumb-wheel the slide-block is raised or lowered and remains in any position in which it is left.

After all the necessary large weights up to 50 milligrams are placed on the pan, the weighing from 50 milligrams to $\frac{1}{10}$ of a milligram can be concluded without opening the balance or using the arrest, eliminating the necessity of reading and replacing all small weights or the handling of a rider with a consequent enormous saving of time.

BETHLEHEM FOUNDRY AND MACHINE CO.

SOUTH BETHLEHEM, PA.

New York Office: SINGER BUILDING

PRODUCTS: Acid Fans; Acid Eggs; Acid Tanks Autoclaves; Acid Stills; Chemical Pots; Chemical Castings; D-Retorts; Salt Pans; Special Valves and Fittings; Iron and Steel Apparatus for the Manufacture of Sulphuric, Nitric, Acetic, Muriatic, Stearic and other Acids, besides a Wide Variety of General Apparatus; Nitrators; Sulfonators; Reducers, etc.

ADVANTAGES OF BETHLEHEM CONSTRUCTION:

No descriptions are given, or illustrations shown of special pieces of apparatus on this page, as all our work is done from special designs, the property of our customers.

There are, however, certain broad characteristics about Bethlehem Construction which make it different. We are not wedded to the use of any one material or form of construction. Each installation is treated as an individual problem and the special materials and forms of apparatus best adapted to that problem are specified.

Bethlehem-Built apparatus presents a most unusual resistance to heat and corrosion, due to our use of only specially-developed iron and steel mixtures.

As seen from the partial list above our products are as various as the needs of the chemical industry; there are few, if any, industrial chemical operations that cannot be carried out in apparatus designed and built by us.

TANTIRON:

Tantiron, in the many years of its existence has stood, and is today, preeminent in the manufacture of chemical resistant apparatus, as an acid, alkali and rust-proof metal, especially well-adapted for the handling of corrosive liquids of any nature.

Tantiron is a hard, close-grained, silvery-white alloy, melting at about 1,400° C., a melting point higher than cast iron. It does not rust or oxidize, nor is it affected by corrosives to any significant extent.

These acid-resisting qualities of Tantiron are not affected by its machinability. It can be bored, turned, planed, drilled and with skillful treatment even tapped, though these operations may be more difficult of performance than on gray iron.

Tantiron can be made into castings varying in weight from a few ounces to many tons.

Tantiron in the field of chemical equipment has proven its superiority. Parties confronted with the problem of handling corrosive liquids are invited to correspond with this organization—which will demonstrate by actual tests the superiority of Tantiron, and its application to their particular requirements.

Such problems as are laid before us are considered strictly confidential, and though we have produced some of the most difficult apparatus in use, we do not allow ourselves the difficulty of using the designs of the same for advertising or other purposes.

Tantiron equipment is made from either standardized or special patterns.

RESISTANCE TO CORROSION:

The action of a few standard chemicals on Tantiron is shown in the following table, with the loss in grams per square inch exposed surface.

This is the only reliable basis on which data from various tests can be compared.

Samples were machined all over and immersed after careful weighing, in the solutions stated. They were thoroughly cleaned and reweighed after 24 hours.

Loss in Grammes per Square Inch at 60° C.

Sulphuric Acid	10%	.288
“ “	30%	.0873
“ “	60%	.002
“ “	conc.	.001
Nitric “	25%	.024
“ “	45%	.009
“ “	conc.	.024
Acetic “	50%	.069
Copper Sulphate Acid Sol.	..	.008
“ “ Alkali Sol.	..	.000
Bromine Water Sat. Sol.	..	.003

The loss usually is less for subsequent immersion as, for example, the following tests will show:

Loss in Grammes per Square Inch

	1st 24 hrs.	2d 24 hrs.	3d 24 hrs.
Sulphuric Acid 10%	.2880	.0748	.0279
“ “ 30%	.0873	.0190	.0000
“ “ 60%	.0123	.0012	.0015

J. BISHOP & CO. PLATINUM WORKS

Platinum, Gold and Silver Refiners

PHILADELPHIA,
1124 Real Estate Trust Bldg.

MALVERN, PA.
ESTABLISHED 1842

CABLE ADDRESS
Rhodium, Philadelphia, Pa.

PRODUCTS: **Platinum Ware for Chemical, Electrochemical and Metallurgical Use, including Anodes, Beakers, Bottles, Cathodes, Coils, Combustion Boats, Crucibles, Dishes, Filter Cones, Muffles, Pans, Retorts, Spray Nozzles, Stills, Tongs, Triangles, etc.; Platinum Wire, Gauze, Sheet or Foil for any purpose, Pure or Alloyed; Platinum for X-Ray Apparatus; Iridium; Rhodium; Palladium; Ruthenium; Platinum Black; Platinum Gauze; Platinum Sponge; Platinized Asbestos; Perforated Sheet Platinum; Platinum Salts and Solutions; Platinum Steam Jet Injectors; Platinum-Rhodium Wire for Thermo-couples; Seamless Platinum Tubing, either Straight or Bent; Platinum for Surgical, Physical and Chemical Apparatus; Platinum Foil or Wire for Electric Heaters and Furnaces; Platinum and Iridium Contacts for Electrical Ignition and Recording Instruments; Platinum Concentrating Stills Made and Repaired; Metals of the Platinum Group Essayed.**

HAMMERED PLATINUM CRUCIBLES:

With or without Covers, any size or weight.

Unless otherwise ordered, Covers are furnished with Crucibles.

Plain form Platinum Crucibles and Covers weigh approximately as many grammes as their Cubic Centimeter capacity.

SPECIAL WORK DONE TO ORDER:

We give careful attention to the manufacture of special forms of Platinum for Chemical, Electro-Chemical and Metallurgical use from drawings or models. Estimates will be furnished if desired.

The business conducted by the J. Bishop & Company Platinum Works was founded by Joaquim Bishop, who was formerly connected with the Department of Chemistry in the University of Pennsylvania.

Experimenting along the line of melting refractory materials, in association with Dr. Robert Hare, special apparatus was devised for the treatment of Platinum. This led our founder to take up the manufacture of Platinum Apparatus for Chemical and Metallurgical purposes, and eventually to the establishment in 1842 of the *first* Platinum works in the United States, being the *first* to melt Platinum in a commercial way and to manufacture what is known as Hammered Platinum Ware.

Prior to this time Platinum Apparatus was limited to a few crude forms, being much heavier and with the increased value of the metal would now be prohibitive for many purposes.

With this change in the method of treatment of Platinum, its production in the varied forms in which it is now manufactured was rendered possible, nearly all the present standard forms of Platinum for Chemical purposes being first made in our works.

With our long experience in the Platinum worker's art and employing a competent corps of artisans, we are able to furnish Platinum in manufactured forms that is unexcelled for durability and satisfactory service.

On account of frequent fluctuation in Platinum rates, we do not issue a Price List. Quotations will be cheerfully submitted upon request, subject to prompt acceptance and change without notice, F.O.B. Malvern, unless otherwise specified by us. Prices, Net Cash, not subject to any discount. Platinum scrap, or materials containing Platinum values, Purchased or Refined.

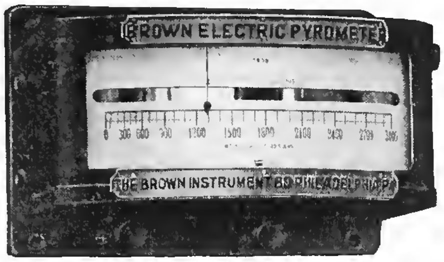
HAMMERED PLATINUM DISHES:

THE BROWN INSTRUMENT COMPANY

PHILADELPHIA, PA.

NEW YORK PITTSBURGH CHICAGO

PRODUCTS: Pyrometers, Thermometers, Tachometers, Recording Gauges, Voltmeters, Ammeters and other Scientific Instruments.



INDICATING PYROMETER

BROWN PYROMETERS:

These instruments are extensively used for measuring high temperatures in chemical retorts, ovens, flues and pipes, in brick kilns, glass works, gas plants and steel furnaces.

HIGH RESISTANCE:

Brown Pyrometers are of what is known as the high resistance type.

They have such a high internal resistance that changes in length of wiring connecting the thermocouple and instrument, also changes in atmospheric temperature along the wiring have no effect on the accuracy of the instrument.

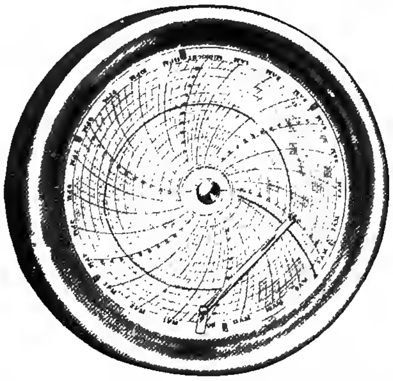
RECORDING PYROMETER

THERMO-COUPLES:

These are supplied of nickel-chromium alloys for temperatures to 1800° F. or 1000° C. and of platinum-rhodium for temperatures to 3000° F. or 1600° C.

RECORDING THERMOMETERS:

Brown Thermometers operate on the gas-expansion principle, a bulb containing nitrogen gas under pressure being connected by capillary tubing to a helical spring, to which the pointer in an indicating or recording instrument is attached. These instruments have no glass tube to be broken as in a glass thermometer, the dial can be placed at any convenient point within 100 feet of the bulb, and the instruments are unaffected by atmospheric changes in temperature along the connecting tubing. They are suitable for measuring all ranges in temperature up to 800° F. or 425° C.



SELF-CONTAINED RECORDING THERMOMETER

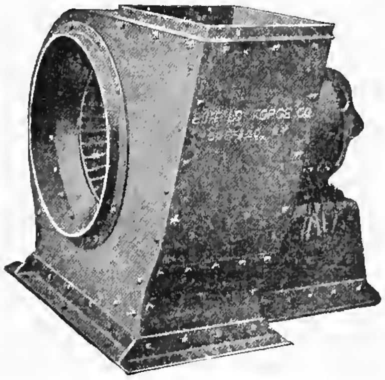
LONG DISTANCE RECORDING THERMOMETER

BUFFALO FORGE CO.

BUFFALO, NEW YORK

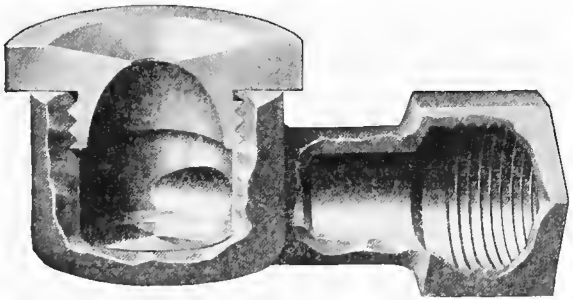
PRODUCTS: Heating and Ventilating Apparatus, Conoidal Fans, Indirect Heaters, Exhausters and Blowers, Spray Nozzles.

NIAGARA CONOIDAL FAN:



The most efficient commercial fan for heating, ventilating and mechanical draft. Send us your ventilating problem and our experienced Engineering Corps will make recommendations. Write for Catalogue No. 201.

BUFFALO SPRAY NOZZLES:

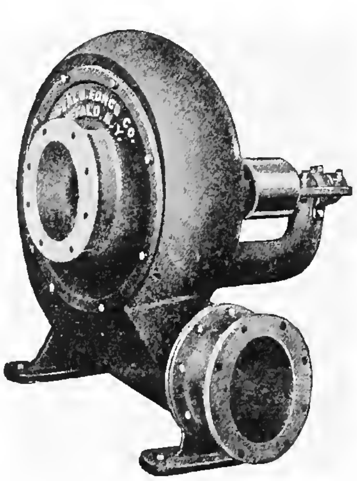


BUFFALO SPRAY NOZZLE

All the large steel concerns, chemical plants, blast furnaces and central power stations use Buffalo Spray Nozzles for cooling ponds, for air conditioning, gas washing and spraying chemicals. They give the finest atomized spray with a minimum water pressure and on account of the large water passages, minimum danger of clogging.

BUFFALO GAS EXHAUSTER:

We make a specialty of Centrifugal Exhaust Fans for handling acid gases. These exhausters are made of hard lead, cast iron, copper, monel metal or whatever material is best suited for your conditions, and are designed by our expert engineering staff.



BUFFALO GAS EXHAUSTER

MECHANICAL DRAFT:

For supplying blast to stoker-fired furnaces, a motor or turbine driven blower is better than a slow speed fan. Buffalo Turbo-Conoidal fans are specially designed for this service and have the most desirable characteristics.

SPRAY NOZZLE SPECIFICATIONS

Diam. of Pipe Connection	Diam. of Opening in Cap	Price Brass Nozzles	Price C. I. Nozzles	Pressure in Pounds per Square Inch (Capacities in pounds of water per minute)										
				10	20	25	30	40	50	60	70	80	90	100
¼″	1/32″	1.50	2.00	.27	.39	.44	.48	.55	.62	.68	.73	.79	.83	.89
¼″	1/16″	2.00	2.00	1	1.5	1.7	1.8	21	2.4	2.6	2.8	2.9	32	3.4
¼″	3/32″	2.00	2.00	2.3	3.3	3.7	4	4.6	5.2	5.7	6.1	6.5	6.9	7.3
⅜″	⅛″	3.00	2.50	4.6	6.5	7.3	8	9.2	10	11	12	13	14	15
⅜″	3/16″	4.00	3.00	10	15	17	18	21	23	26	28	29	31	33
½″	¼″	4.80	4.00	18	26	29	32	37	41	45	49	52	56	58
¾″	⅜″	8.00	5.00	51	72	81	88	102	114	125	135	144	153	162
1 ″	½″	12.00	6.00	91	128	144	157	181	202	222	240	257	272	
1¼″	⅝″	16.00	7.00	127	182	204	226	257	287	310				
1½″	¾″	20.00	9.00	186	263	295	332	370	415					
2 ″	⅞″	24.00	11.00	252	356	400	435	501						
2 ″	1 ″	28.00	15.00	330	465	522	570	657						

Write for data on Spray Nozzle uses. It may point to Improvement in your work.

BUFFALO STEAM PUMP COMPANY

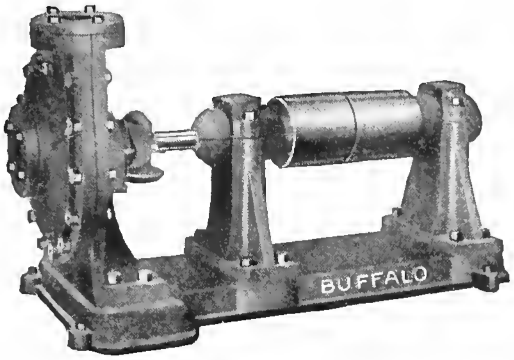
MANUFACTURERS OF

Steam, Power and Centrifugal Pumps, and Condensers

490 Broadway
Branches in All Principal Cities
BUFFALO, N. Y.

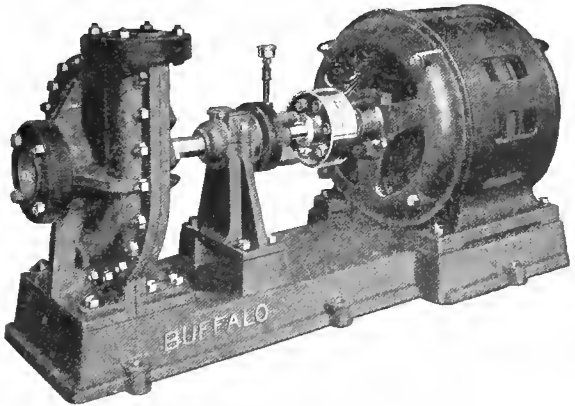
PRODUCTS: Acid Pumps, Single Stage and Multi-Stage Centrifugal Pumps, Single and Duplex Steam Pumps, Triplex Power Pumps, Vacuum Pumps and Condensers.

ACID PUMPS:



PULLEY DRIVEN ACID PUMP

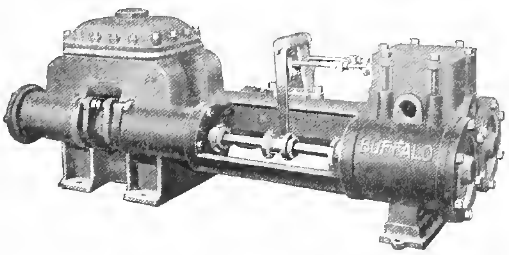
Built in sizes 1½", 2", 3" and 4" single and twin, for pulley and motor drive. Made in iron, lead, bronze, copper, tin, aluminum, monel metal or any material desired which will best withstand action of acid being handled. These pumps have ring oiling bearings, fitted with removable split bronze liners, have large thrust bearings, and are designed throughout for hard, continuous service.



MOTOR DRIVEN ACID PUMP

STEAM PUMPS:

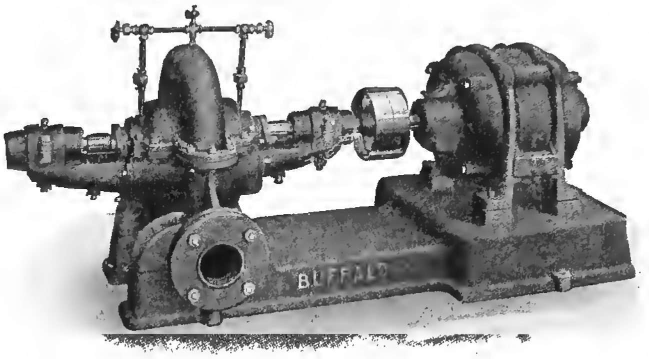
Single and Duplex, Simple and Compound, piston packed, outside center packed, outside end packed and valve pot types. Suitable for boiler feeding, general water supply, and filter press service. All iron, brass fitted, or all brass.



DUPLEX OUTSIDE CENTER PACKED PUMP

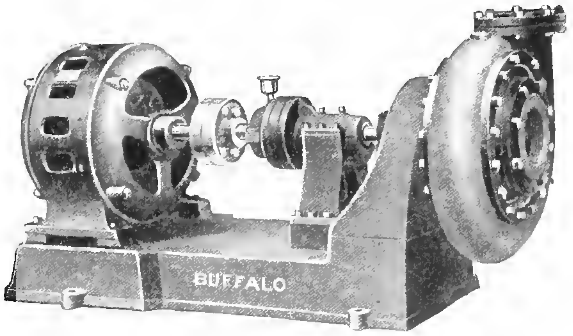
CENTRIFUGAL PUMPS:

Single and double suction in sizes ranging from ½" to 48". Runners are so designed that maximum power never exceeds normal operating power more than 15 to 20 per cent. Can be arranged for horizontal or vertical operation, belt, motor, engine or turbine drive. Built of special metal if desired. Suitable for all services where operating head does not exceed 150 to 200 ft.



DOUBLE SUCTION CENTRIFUGAL PUMP

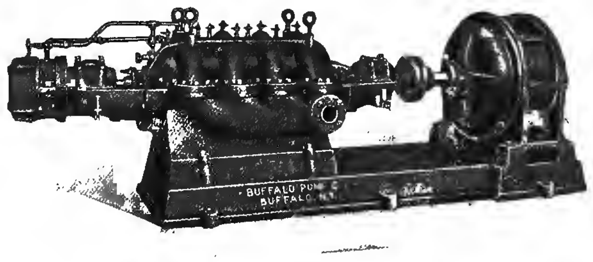
A complete line of open end suction pumps with specially designed impellers for handling thick and heavy materials which would clog the ordinary pump. Heavy duty design, with ring oiling bearings and large thrust bearing mounted on an independent pedestal.



SINGLE END SUCTION CENTRIFUGAL PUMP

MULTISTAGE PUMPS:

Built in two to eight stages for heads as high as 800 ft. Runners of the double suction type, assuring that there will never be unbalanced thrust. The ideal unit for boiler feed service. Regular or brass fitted. Speeds suitable for motor or steam turbine drive.



DOUBLE SUCTION MULTISTAGE PUMP

BUFFALO FOUNDRY & MACHINE COMPANY

26 Winchester Avenue
BUFFALO, N. Y.

NEW YORK OFFICE:
17 Battery Place

CABLE ADDRESS: "Bufoundry"

PRODUCTS:

Page

"BUFLOKAST" CHEMICAL APPARATUS AND COMPLETE CHEMICAL PLANTS.......118-122

For producing Heavy Chemicals, Acids, Alkalis, Organic Chemicals, Coal Tar Colors and other Kindred Products (see partial list below).

"BUFLOKAST" ACID-RESISTANT AND OTHER SPECIAL CHEMICAL CASTINGS.122-123

"BUFLOVAK" VACUUM DRYERS.......123-124

"BUFLOVAK" EVAPORATORS.............. 125

ENGINEERING:

The success of "Buflokast" Chemical Equipment rests largely on the ability of our engineering department to deal effectively with chemical problems. Our chemical engineering staff is composed of specialists occupying the foremost position in their respective fields in the chemical industry. The professional advice of these men is backed up by our exceptional facilities and the scientific control over the manufacturing processes in our laboratory-controlled plant.

Quality and not price is the basis on which "Buflokast" Chemical Plants are built and sold—efficiency and durability being the watchwords that govern their design and manufacture. That is why we are constantly replacing other apparatus with "Buflokast" Equipment. In short, our engineers work with a view to the ultimate cost to the user—the only true basis of economy.

COMPLETE PLANTS:

The striking development of the chemical industry in America has brought forcibly to the front the service rendered by this Company in making it possible for American manufacturers to better meet the many new problems, as a result of the war, that confronted them.

An important feature of this work was the ability to furnish Chemical Apparatus and Complete Chemical Plants, these plants being designed, constructed, and operated (under guarantee where desired).

We mention below some of the materials whose satisfactory production can be assured by using the "Buflokast" Equipment designed for the particular product to be manufactured.

INDIVIDUAL PIECES ALSO FURNISHED:

Where an entire chemical plant is not desired, we can supply any section of the same, or individual pieces of apparatus for all chemical operations, such as nitration, sulphonation, reduction, chlorination, caustic fusion, etc.

ORGANIC CHEMICALS MANUFACTURED WITH "BUFLOKAST" CHEMICAL PLANTS:

(Separate Parts furnished, if desired)

Aniline
Toluidine
Ortho- and Para-
  Xylidine
Para-Amido-Phenol
Dinitrochlorbenzol
Nitrobenzol
Nitro-toluol
Metanilic Acid
Sulphanilic Acid
Meta-Phenylenediamine

Para-Phenylenediamine
Meta-Toluylenediamine
Meta-Nitraniline
Para-Nitraniline
Acetanilide
Amidoazobenzol
Dimethylaniline
Carbolic Acid (Phenol)
Picric Acid
Sulphur Black
Alpha-Naphtylamine

Alpha-Naphtylamine-sulfonic acids, such as naphtionic acid, Laurent acid, Dahl acids.

Freund Acid—Alpha-Naphthol.

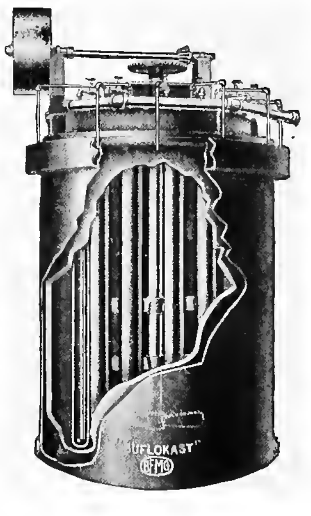
Alpha-Naphthol-sulfonic acids, such as Neville-Winther acid and Cleve Acid.

Beta-Naphthol—Beta-Naphthol-sulfonic acids, such as Schaeffer acid, R, G, and F acids.

Amido-Naphthol-sulfonic acids, such as H acid and Gamma acid.

"BUFLOKAST" NITRATOR:

The "Buflokast" Nitrator is noted for its high yield. It consists of a special cast-iron body surrounded on the sides and bottom with a cooling jacket. The large size (illustrated) also contains a series of closed end tubes, providing exceptionally quick cooling facilities in the center as well as along the sides of the interior. Water is forced to the bottom of the tubes which are individually controlled. The temperature of the over-flow from each tube can be noted and is regulated by a valve. The use of these tubes is made possible by our patented method of casting the tubes without chaplets, thus in-



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"BUFLOKAST" NITRATOR—Continued:

suring freedom from leaks. This is the only successful method so far devised for manufacturing these tubes.

The apparatus is constructed throughout to withstand the heavy duty it is designed to perform. The special quality of metal used in the nitrator body, cast iron shaft and closed end tubes is the result of our long experience in furnishing castings for chemical work.

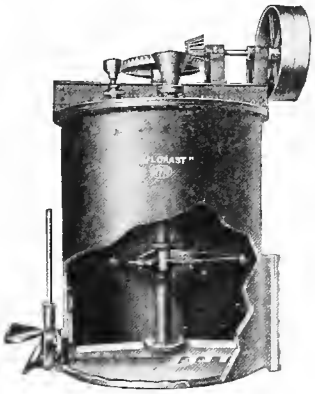
Three "boat type" propellers combined with the "bumbed" bottom of the nitrator insure thorough agitation of the liquid, especially in the center. Other features are ball bearings; special semi-steel out gears; large factor of safety, etc.

In the smaller sizes the tubes are omitted as sufficient cooling facilities are contained in the outer jacket.

"Buflokast" Nitrators are furnished in four standard sizes and capacities as follows: 1,600 gallons; 800 gallons; 400 gallons; 200 gallons. Special sizes or nitrators for operations requiring other special features can be built to order.

"BUFLOKAST" REDUCER:

Especially noted for its large output, ease and cleanliness of operation. Carefully constructed to meet the working conditions for which it is designed. The apparatus consists of a specially constructed cast-iron body. The bottom and lower portion of sides are lined with special quality liner plates which are readily removable and can be renewed as occasion requires. The side plates are reversible, so that the upper portion of the plate can be used when the bottom part has become worn.



The shaft and agitator are suspended from a bearing in the top of the reducer and are also supported by a heavy bearing in the yoke midway in the reducer, as illustrated, thus eliminating the objectionable bottom or step bearing commonly used. A special feature of both shaft and agitator is that they are hollow, the steam being introduced through the shaft at the top and distributed in the reducer by means of outlets in the agitator. The agitator is of the tooth type, which insures better agitation and requires less power to operate than the plow type, so commonly used.

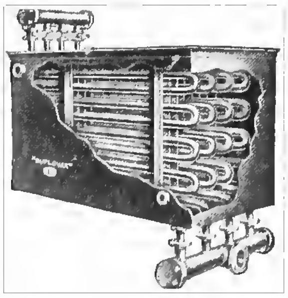
A large door on the side facilitates the removal and renewal of the liner plates when required, this door being fully protected by the lining. The materials and workmanship are first-class throughout, the cast-iron being of a special quality as used in apparatus of this character.

Other features are the improved unloading device which automatically raises the valve when opened, and wedges it in position when closed; semi-steel driving gears, large factor of safety, etc.

Where a reducer with higher heating facilities is desired, we furnish a jacketed type.

"Buflokast" Reducers are built in four standard sizes with capacities as follows: 1,600 gallons; 800 gallons; 400 gallons; 200 gallons. Special sizes or reducers for operations requiring other special features can be built to order.

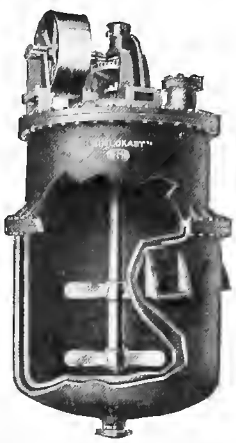
"BUFLOVAK" REFLUX CONDENSER:



Reflux condensers are built in two types. One is rectangular in form with four zigzag coils of wrought iron pipe. All coils are connected by a manifold, with this great advantage—that each coil can be regulated independently of every other.

The other type condenser is circular in form, and being of more simple construction is less expensive than the rectangular type. It is in extensive use and gives efficient service.

"BUFLOKAST" SULPHONATOR:

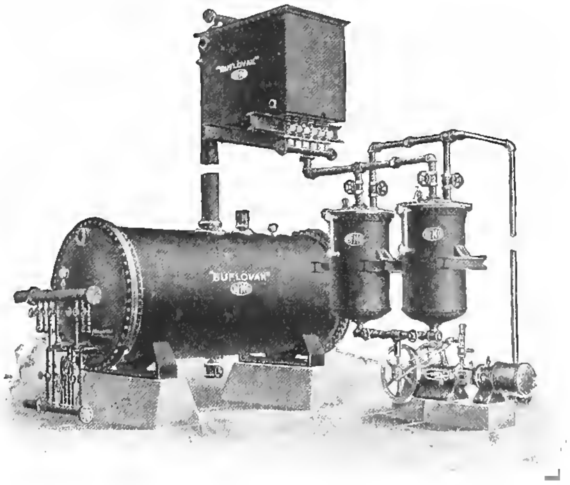


The illustration speaks for itself. As will be seen, the design of the "Buflokast" Sulphonator is especially heavy and durable. On account of the action of the acids commonly treated in the kettle, a special quality of metal is used in the construction of the apparatus. The sides and bottom are steam jacketed. Efficient agitation is provided by means of "boat type" propellors attached to a shaft which extends through a stuffing box in the cover. Lugs for supporting the apparatus are provided.

The "Buflokast" Sulphonator, which is noted for its efficiency and durability, is built in a variety of sizes as required.

"BUFLOVAK" VACUUM STILL:

Constructed of heavy steel plate and provided with heating coils in the bottom of the still. A gooseneck and vapor pipe extend from the top to a condenser of ample size capacity. The still is also provided with two receivers and a vacuum pump.



These vacuum stills—furnished in various sizes, either the horizontal or vertical type—are built in accordance with the high standards of our other Vacuum Apparatus. Their design has been worked out with exceptional care as to details.

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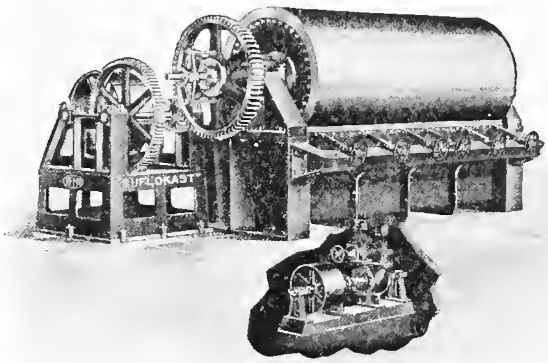
ATMOSPHERIC DRUM DRYER:

Our laboratories have worked out new methods and apparatus for manufacturing various materials—the "Buflokast" Atmospheric Drum Dryer being but one example of the equipment thus produced.

The patented, successful principles of operation in this dryer are the cause of its exceptional success. It embodies the principles of the famous "Buflovak" Vacuum Drum Dryer. It is used for drying many liquid materials which do not require a vacuum, such as sodium benzol sulphonate, sodium acetate, etc.



This dryer consists of a hollow cylindrical drum supported over a cast iron storage tank. The drum is made of a special quality of cast-iron, and has a smooth polished surface. The steam is introduced through the bearing at one end and the condensed steam or water is drained off through the opposite end.

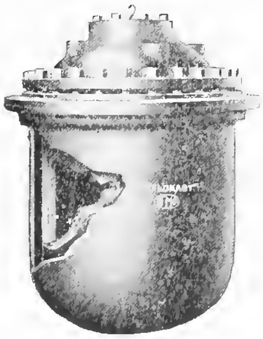
The storage or reserve tank is made in one piece, thus eliminating joints in the tank and removing all danger of leakage through parts becoming loose or disconnected.

Our patented automatic device for applying the liquid to the drum produces a uniform coating on the drum and consequently a uniform dry product. The arrangement is such that only a small part of the drum surface is in contact with the wet material, leaving a greater working area for the drying of the material, and thus producing a maximum output at a minimum cost for steam, power and labor. The scraper or knife is adjusted to the drum by a special device—controlled by a series of handwheels—which permit the most accurate and delicate adjustment.

These dryers furnished in four standard sizes, the cut showing the largest standard, having a drum 5 ft. diameter by 12 ft. long. Special sizes built to order as required.

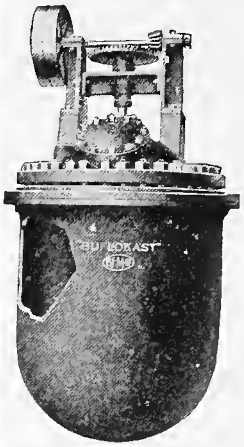
"BUFLOKAST" AUTOCLAVES:

Space does not permit much detail. The illustrations speak for themselves. "Buflokast" Autoclaves are built for any pressure as desired.



They are constructed of cast-steel, bronze or cast iron, depending on the pressure desired and the nature of the material to be treated. Built with or without outer jacket and with or without stirring devices.

Where the action of the material being treated makes it desirable a special lining of "Buflokast" acid-resistant or other special metal is provided, as shown in the 75 gallon autoclave, used in manufacturing Dimethylaniline and other similar products.

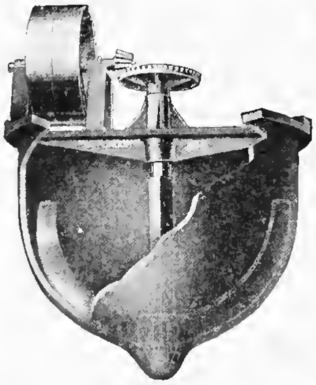


The design and construction of "Buflokast" Autoclaves are typical of those which characterize all "Buflokast" apparatus. Built in all commercial sizes. We also manufacture many small sizes for laboratory purposes. Autoclaves of special size and design built to order.

"BUFLOKAST" FUSION KETTLES:

The important feature about "Buflokast" Fusion Kettles is the fact that they are made of the same quality of metal used successfully for so many years in the manufacture of our caustic pots. This mixture of metal is designed to combat or resist the combined action of the caustic and the temperature to which the kettles are usually subjected.

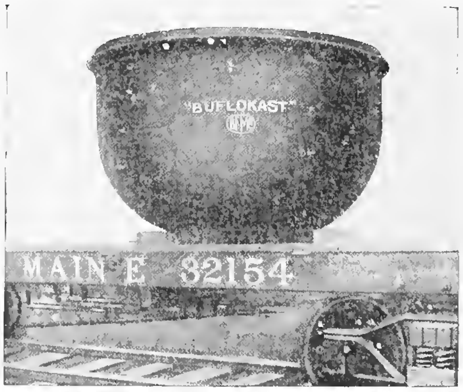
The Kettle is provided with an improved type agitator attached to a shaft made of the same special metal as the kettle. The shaft and agitator are suspended from a heavy bridge at the top which also supports the driving mechanism. The shaft operates in a removable seat, which can be renewed when worn as occasion requires.



The "Buflokast" Fusion Kettle can be furnished with a draw-off spout at the bottom when this is desired.

The kettles are built in various sizes as required, the most popular being our 600 gallon and 1500 gallon sizes

"BUFLOKAST" CAUSTIC POTS:



These pots are so widely known throughout the chemical industry that a brief reference to them will suffice here. With few exceptions all the caustic pots

Continued on Next Page

"BUFLOKAST" CAUSTIC POTS, Continued

now used are "Buflokast." The success of these pots is clearly indicated by reports from our customers showing that they give from three to five times more service than those purchased elsewhere, either in this country or abroad. "Buflokast" Pots are built in varying sizes up to the capacity of the railroad companies to handle them, most manufacturers preferring to use the largest size they can secure.

CAUSTIC FLAKING APPARATUS:

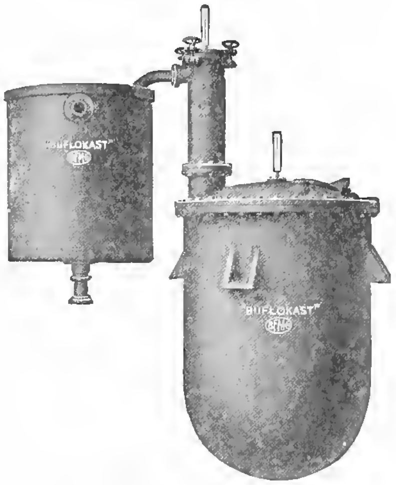
We are prepared to furnish apparatus for flaking caustic soda, having made a number of successful installations. Full information on request.

"BUFLOKAST" PHENOL (CARBOLIC ACID) STILL:

An efficient apparatus working successfully in many installations. Noted for its simplicity in design and durability in service. Constructed of a mixture of metal with special reference to the action of the acids combined with the temperature of the still while in service.

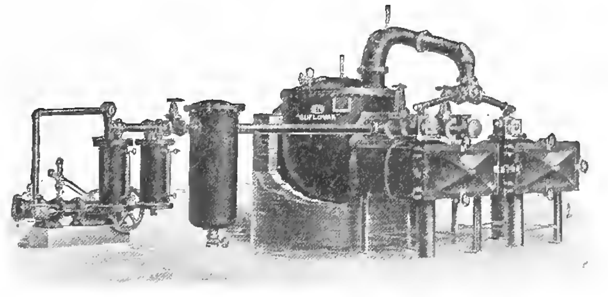
The top of the still is provided with a large manhole with cover, and an extended pocket for holding the charcoal basket, the latter being a special provision for deodorizing the vapors passing from the still to the condenser.

The condenser is arranged for water supply at the bottom and overflow at the top and is fitted with a special coil to prevent discoloration of the acid. The still is provided with lugs on the side for supporting the same on brickwork or furnace top. Built in varying sizes as desired, the illustration showing our 500 gallon size.



BETA NAPHTHOL STILL:

The illustration shows the general arrangement of a "Buflokast" Beta Naphthol Still with condenser, receivers, separators, vacuum pump, etc. Judging by reports from users, it is doubtless the most successful still for the purpose now in use. It overcomes the difficulties encountered in Beta Naphthol distillation, especially in subliming, and vapors are prevented from passing to the vacuum pump. Built in various sizes as required.



"BUFLOKAST" EQUIPMENT FOR HEAVY CHEMICALS, ACIDS AND HIGH EXPLOSIVES:

Perhaps one of the most significant things that can be said about "Buflokast" Equipment in this particular field is that "Buflokast" Plants are used by a majority of the largest manufacturers of high explosives in the United States today.

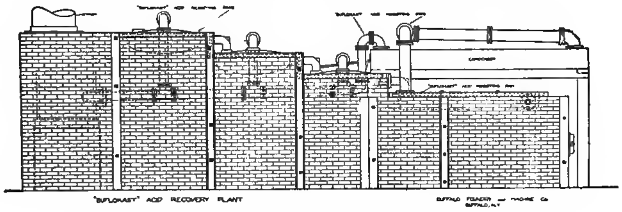
We furnish complete plants or individual pieces of apparatus for the manufacture of Nitric, Sulphuric and Hydrochloric acid; Trinitrotoluol and other products in the same field.

The experience of the past two years with "Buflokast" Equipment for these products has shown the satisfaction that accrues to a manufacturer whose apparatus is based on past experience in industrial chemistry.

The following covers a small part of our present activities in these fields.

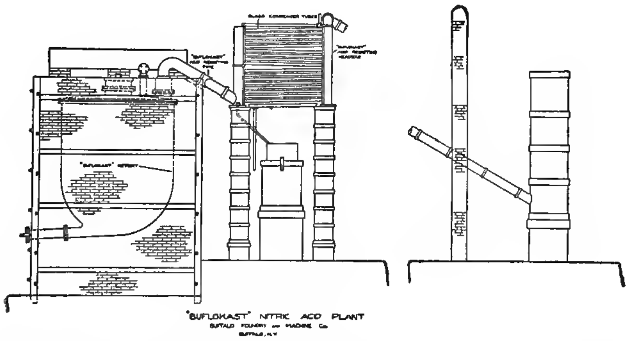
"BUFLOKAST" RECOVERY PLANT FOR SULPHURIC AND NITRIC ACID:

This plant eliminates the use of steam for the separation of acids, consequently no water is added to be again evaporated. The cascade system is used, the acid being run through special "Buflokast" covered concentration pans. Nitric fumes are driven off and recovered when desired in absorption towers; the sulphuric acid is recovered from the cascades. NO OBJECTIONABLE FUMES. The low cost at which concentration and separation area ccomplished by this plant will interest you. Low operating cost and low maintenance cost are characteristic features of all "Buflokast" Equipment.


"BUFLOKAST" ACID RECOVERY PLANT
BUFFALO FOUNDRY & MACHINE Co.
BUFFALO, N.Y.

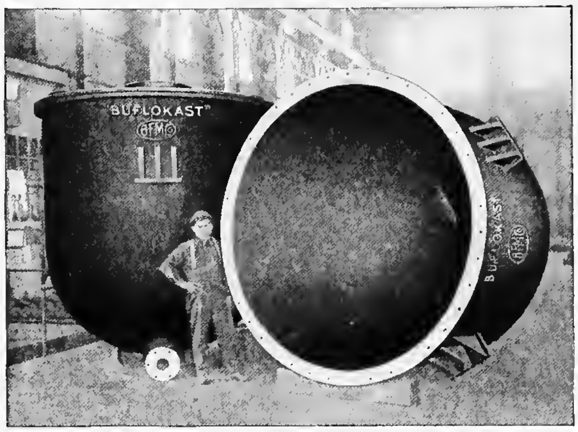
"BUFLOKAST" NITRIC ACID PLANT:

The etching shows the latest practice in nitric acid manufacture and speaks for itself. This is noted for its efficiency and economy and is conceded to be by far the most satisfactory method of manufacturing nitric acid. The special type retorts here indicated and more fully illustrated in next paragraph are furnished independently of the complete plant.



"BUFLOKAST" NITRIC RETORTS:

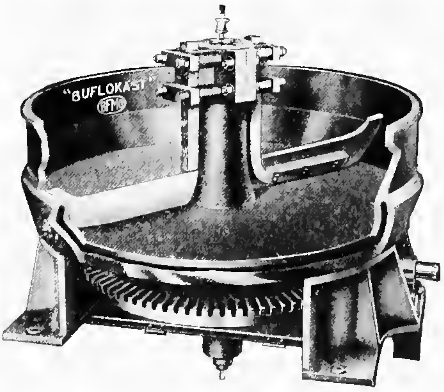
These are the special nitric retorts indicated in the preceding paragraph, being used by most of the high explosive companies and other manufacturers of nitric acid.



The manufacture of these retorts is an example of what can be accomplished by exceptional facilities, correct foundry and metallurgical methods. Furnished in the vertical and horizontal types in various sizes as required.

CRYSTALLIZING PAN:

An efficient apparatus for concentrating and crystallizing materials permitting high temperatures. It is used almost exclusively in this country for evaporating the neutralized liquor of ammonia and nitric acid and drying and crystallizing the finished product. After the ammonium nitrate comes from this apparatus it is thoroughly dry. Steam is used in the jacket for concentration and cold water for crystallization. Also used as an atmospheric dryer.

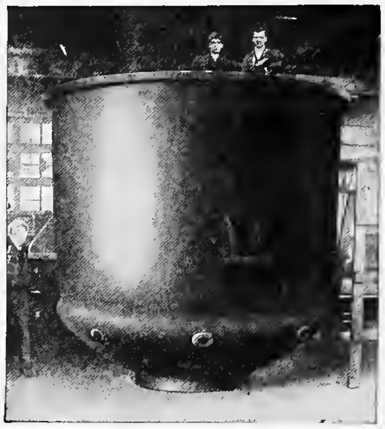


VACUUM CRYSTALLIZER:

Embodies the same principles as the above except that it is operated under a high vacuum, thus permitting the handling of more delicate materials on account of the lower temperature employed. Excellent for "sticky" materials that become "gummy" or "ball up."

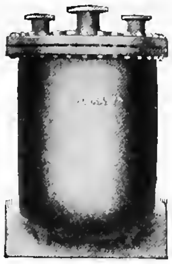
SPECIAL CHEMICAL CASTINGS:

Besides the standard and special equipment mentioned in these pages, we are prepared to furnish special castings for chemical and other work, having certain qualities not found in ordinary castings. In making such castings all materials used are first chemically analyzed and all metal mixtures produced with laboratory exactness. The result is a finished casting of known quality with physical and chemical properties, suited to the condition it is to meet. The illustration on the left shows a hydrochloric pan. Our facilities enable us to furnish special castings in any size that can be transported by rail.



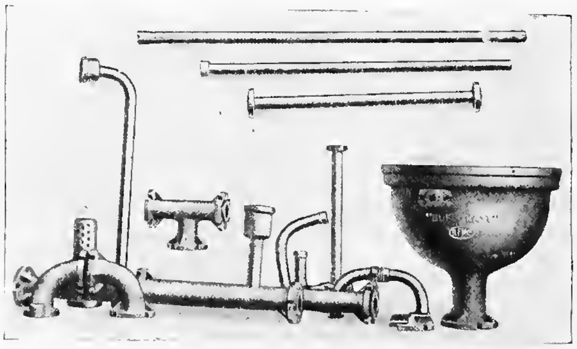
ACID EGGS:

Made up in many sizes and types, horizontal and vertical for various pressures, to suit the special requirements of each. "Buflokast" Acid Eggs are particularly noted for their durability, made as they are with a view of the service they are intended for.



"BUFLOKAST" ACID RESISTANT CASTINGS:

The acid-resistant qualities of "Buflokast" Acid Resistant Castings are equal, and many users say superior, to any acid resisting castings now obtainable either in this country or abroad, with the added advantage that they can be made in larger sizes than is possible with any other metal mixtures on the market intended for similar use.



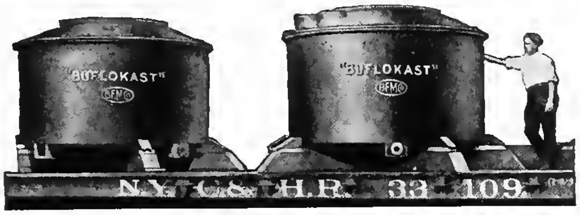
This is made possible by our exceptional facilities, experience and system of laboratory control.

Continued on Next Page

In most cases "Buflokast" Acid-Resistant Castings are replacing stoneware and silica ware and overcoming the many objections found in the use of these materials, with the added advantage that "Buflokast" is more durable and has greater strength.

Closed end tubes 9 ft. long, cast without chaplets. Note uniformity in thickness of metal as shown in longitudinal half section.

Our long experience in this work has given us much valuable information as to the best mixtures of metal to use with various dilute and concentrated acids at different working temperatures, and has enabled us to constantly increase the size of the castings in which "Buflokast" Acid-Resistant metal mixtures can be poured. On this latter point the illustrations speak for themselves.



A special method of reinforcement is used when castings are to be used under pressure.

"BUFLOVAK" VACUUM DRYING APPARATUS:

Including vacuum drum, shelf and rotary dryers, dry vacuum pumps, evaporators, condensers, impregnating apparatus, solvent reclaiming and special vacuum apparatus.

GENERAL:

In "Buflovak" Vacuum Drying Apparatus, we present an economical, safe and positive means for drying all classes of materials. Materials that would be injured by excessive heat or can be dried otherwise only at prohibitive cost may be dried economically in "Buflovak" Dryers. An extremely low temperature is assured by the maintenance of a high vacuum in the apparatus. The drying is done very rapidly and materials can be dried in a few hours that otherwise would require days or weeks.

"Buflovak" Vacuum Dryers are also far more economical because of the extremely low operating cost and quick drying time. They enable the manufacturer to obtain an improved quality in the dried product. The low temperatures at which materials can be dried in "Buflovak" Dryers permit the drying of many materials without injury or danger of overheating that cannot be satisfactorily dried by any other method.

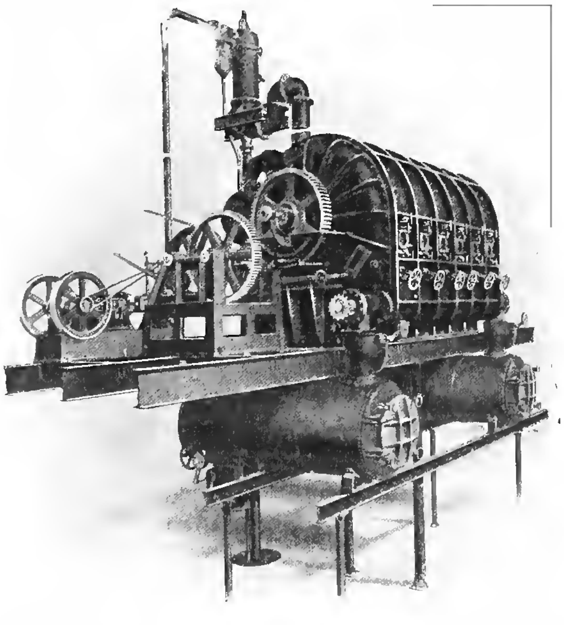
Some of the advantages of using "Buflovak" Vacuum Drying Apparatus are as follows:

Low cost of operating.
Elimination of fire risk.
Cleanliness of operation.
Free from obnoxious odors.
Most rapid method of drying.
Saves floor space, steam and fuel.
Temperature under absolute control.
Valuable solvents may be reclaimed.
No overheating of sensitive materials.
Absolute dryness insured when desired.
Drying independent of climatic conditions.
Quality of dried products usually improved.
Materials dried at extremely low temperatures.
Produces a better and more uniformly dried material.
Dries materials that cannot otherwise be dried economically.
Dries materials in a few hours which otherwise requires days or weeks.
Eliminates the necessity of carrying a large stock of dried material or material in process of drying.

"Buflovak" Dryers are built for all materials and to suit any capacity desired.

VACUUM DRUM DRYER:

The ideal apparatus for converting liquids into a dry or powdered form. It is used for drying solutions, emulsions, and pulps, such as DYEWOOD EXTRACT, QUEBRACHO, WHITE LEAD, GLUES, MILK, ACIDS, CHEMICALS, and other liquids containing solids.



While the Vacuum Drum Dryer has in theory been considered the ideal apparatus for drying liquids containing solids, satisfactory commercial results were not attained until our patented devices and methods for applying the liquid to the drum were perfected.

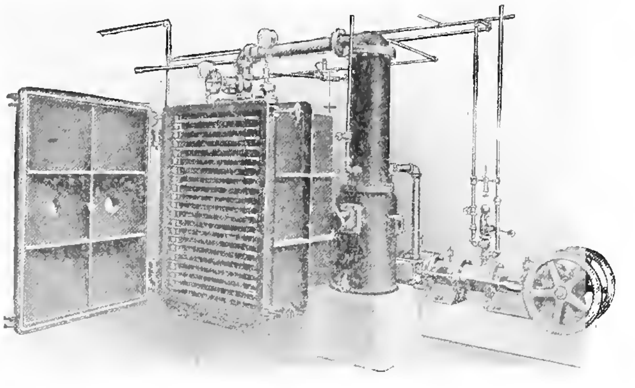
The "Buflovak" Drum Dryer enables the most delicate liquid materials to be converted into dry form at extremely low temperatures—thus removing all danger from overheating—and at a very low cost of operation. In most cases the dried material is delivered as a powder, thus eliminating grinders.

The illustration shows our largest size, having a drum five feet (5') diameter and twelve feet (12') long. This type is also built in four other sizes.

Continued on Next Page

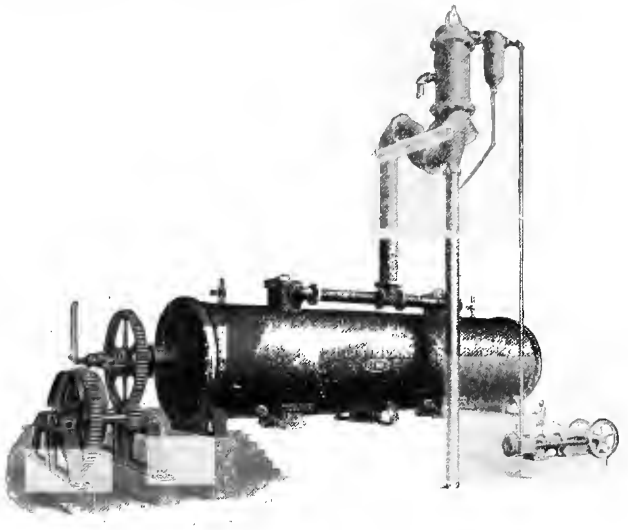
VACUUM SHELF DRYER:

For drying materials that can be handled in pans or trays. In this, as in all "Buflovak" dryers, the most expensive and sensitive materials may be dried without injury or danger of overheating because the temperature is always under absolute control. Built in sizes to meet any capacity.



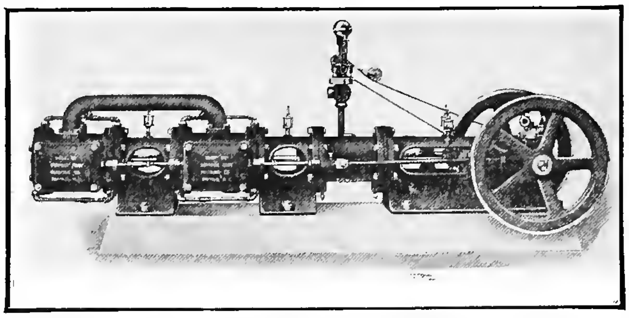
VACUUM ROTARY DRYER:

Used for materials that can be mixed or tumbled. Interior contains revolving heating tube with mixing arms and paddles attached. Jacketed shell is made of lapwelded steel tubing, a distinctive feature of the "Buflovak" dryer. This allows paddles to be set closer to shell than in the welded or riveted steel plate construction, thereby obtaining a higher efficiency. Built in many sizes.



DRY VACUUM PUMP:

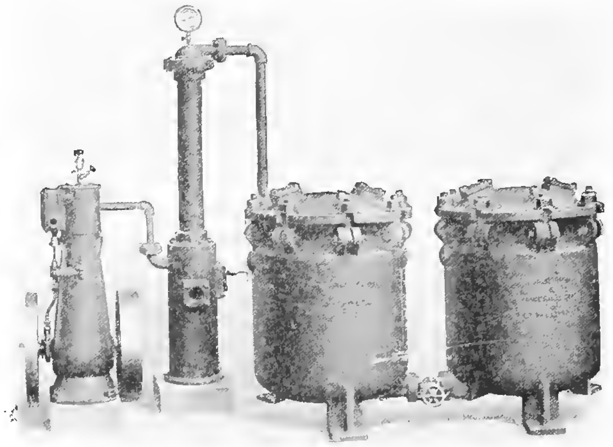
The keynote of successful vacuum drying. The success achieved in "Buflovak" Vacuum Apparatus is partly due to the efficiency of our dry vacuum pumps. Noted for their high vacuum, durability, and low power consumption. Built in various sizes—single or two-stage—steam, belt or motor driven.

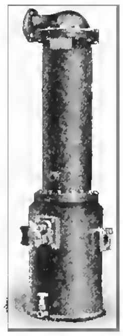


Dry Vacuum Pump—Two-Stage, Steam Driven

VACUUM DRYING AND IMPREGNATING APPARATUS:

Used for impregnating electrical work and other materials with insulating, coloring, waterproofing, and fireproofing compounds. Operates under vacuum and pressure. Built in various types and sizes.





AUXILIARY APPARATUS:

We also build a complete line of auxiliary apparatus, such as Barometric and Surface Condensers, Expansion Tanks, Solvent Reclaiming and Deresinizing Apparatus, etc.

SPECIAL VACUUM APPARATUS:

In addition to our standard vacuum apparatus, we build apparatus to order for special requirements, both from designs submitted by our customers and from designs made by our own engineers.

TESTING LABORATORY:

Working units of each type of vacuum apparatus are maintained in our testing laboratory and we welcome an opportunity to make tests on any material without charge or obligation except for transportation expenses. If you have any material to dry, write us. We can help you.

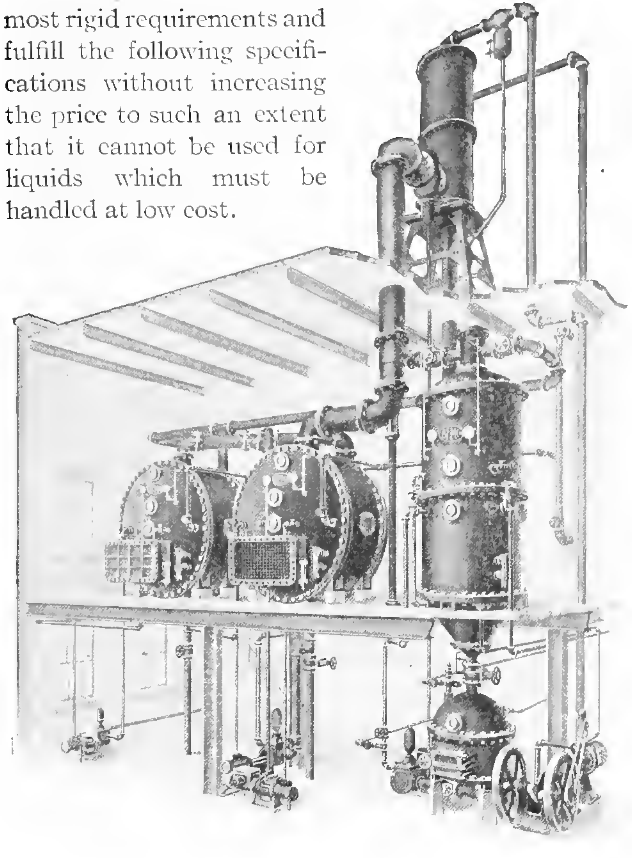
Continued on Next Page

"BUFLOVAK" EVAPORATORS:

Horizontal and Vertical Tube Evaporators; All Cast-Iron Evaporators; Condensers Vacuum Pumps; Receivers; Salt Filters; Preheaters, etc.

"BUFLOVAK" HORIZONTAL TUBE EVAPORATOR:

Is designed to meet the most rigid requirements and fulfill the following specifications without increasing the price to such an extent that it cannot be used for liquids which must be handled at low cost.



Mechanical strength, quality of material and thickness of metal used for all important parts.

The horizontal cylindrical shell and spherical heads will resist any inside or outside pressure without the necessity of excessive wall thicknesses. Shells made in one piece up to 16 feet length, therefore the number of joints and chance for leakage is less than in any other type of evaporator.

Uniform circulation of the boiling liquid in order to prevent coating of the tubes.

The heating surface consists of a rectangular shaped nest of horizontal tubes made tight in the flue plates by special gaskets or by expanding. On both sides of the tube nest separated by partition plates are two large downtakes of uniform width. The liquor boiling up between the tubes at a high speed is given a chance to return to the bottom of the evaporator through the downtake permitting a rapid and uniform circulation. This scouring action willl keep the tubes clean and therefore eliminate the necessity of frequent cleaning.

Proper distribution of the steam over the whole heating surface.

The steam or vapor enters the top of the rear steamchest through a wide manifold; the tubes have a slight pitch towards the front header which is equipped with openings for the removal of the condensed water and non-condensible gases.

Proper proportions of the evaporator so as to avoid losses by entrainment and foaming.

Excessive vapor speed will cause losses by entrainment and this difficulty has been overcome by making the width of evaporator body above the liquor level about twice the width of the tube nest. The amount of liquor in the lower part of the evaporator is comparatively small and foaming can easily be prevented by keeping the liquor level low.

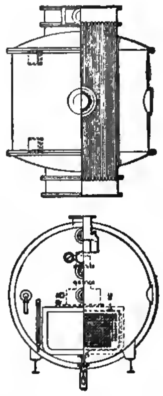


Fig. 1

Possibility of increasing the capacity of the evaporator without being forced to buy an entirely new apparatus.

The heating surface and the capacity of the evaporator increase with the length of the shell; new rings and longer tubes can be added at any time; all other parts remain the same.

Simple construction so that the equipment can be operated and if necessary repaired by unskilled labor.

No pumps necessary for the circulation of the liquor. Boiling process can readily be watched and controlled. Repairs are restricted to replacement of glass and tubes which can all be done by unskilled labor.

The "Buflovak" H. T. Multiple Effect Evaporator is built in any size from 500 sq. ft. heating surface up, for any kind of liquid and of any material suitable for the construction of such apparatus. We also build smaller evaporators having an oval shell with heating surfaces down to 36 sq. ft.

Fig. 1 shows the general construction of the "Buflovak" H. T. Evaporator.

"BUFLOVAK" VERTICAL TUBE EVAPORATORS:

In cases where the liquor to be evaporated contains salts which become insoluble during the concentration, it is very important to remove these salts from the boiling zone as quickly as possible in order to avoid the trouble and delay which is caused by the coating of the tubes with salt crystals.

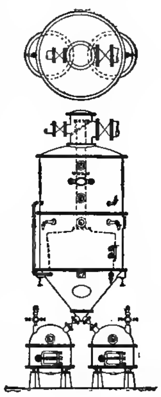


Fig. 2

The type most suitable for this kind of work is the Mantius Crystallizing Evaporator which has been introduced into this country more than ten years ago, and has since become the standard for all electrolytic alkali liquors.

The general arrangement is shown in Figure 2. The large annular downtake permits a uniform circulation of the liquor and a good settling of the precipitated salt which is carried down to the salt filter by gravity. According to the quantity of salt to be handled, one or two salt filters are attached to each evaporator. Steam or vapor enters the top of the steamchest in the center and is readily transmitted to all tubes. Condensed water and non-condensable gases are discharged through the hollow lugs which at the same time serve as supports.

"Buflovak" V. T. Multiple Effect Evaporators are built of any size and material suitable for the construction of such apparatus.

"BUFLOVAK" ALL CAST-IRON EVAPORATOR

We wish to call special attention to the "Buflovak" ALL CAST IRON EVAPORATOR, which is built with vertical tubes made of our special grade of cast iron for the purpose of concentrating liquors which will destroy charcoal iron or copper tubes in a short time. This type can also be arranged for the separation of salt crystals.

A special bulletin describing the construction of this evaporator is in preparation.

CANADIAN CHEMICAL AND CONSTRUCTION COMPANY

Chemical and Metallurgical Engineers and Contractors
Manufacturers and Importers of Chemicals

New York Office:
50 East 41st St.

TEMPLE BUILDING
TORONTO, ONT.

Laboratories, etc.
Toronto, Ont.

PRODUCTS: Complete Plants for Chemical Industries.

SERVICES:

Our services include every step necessary in the development of a chemical industry from its inception in the laboratory to the operation of a complete plant. We are prepared not only to design and erect plants embodying our own ideas, but to superintend the erection of plants based on ideas originated and worked out by the research departments of our clients. Our knowledge of the purpose for which apparatus will be used insures its suitability. We are in a position to secure most satisfactory deliveries and prices for those who place superintendence and erection of plants in our hands.

MANUFACTURE OF PHARMACEUTICAL PRODUCTS:

We are prepared to furnish expert advice on the manufacture of synthetic pharmaceutical products. We have erected plants for the manufacture of salicylic acid, acetyl-salicylic acid, phenacetine, etc.

Our staff has had practical experience in the erection of some of the most complete plants now in existence for this purpose and our designs are prepared on the basis of the experience derived from the actual operation of these plants.

PLANTS FOR EXPLOSIVE WORKS:

Our engineers have had practical experience in designing and erecting equipment for the manufacture of the various explosive products and the raw materials from which they are derived such as phenol, trinitrotoluol, diphenylamine, picric acid, etc. We are prepared to design and erect plants for the production of dinitrophenol both from chlorbenzol and also directly from phenol.

We are also prepared to erect plants for the manufacture of pure, resublimed naphthalene and anthracene. Expert advice given in connection with the recovery of spent acid from nitration processes.

INTERMEDIATES:

Expert advice as to the availability and manufacture of intermediates including among others:

Refined naphthalene
Betanaphthol
Resorcin
Para-amido-phenol
Metol
Dimethylaniline
Dinitrophenol
Nitrobenzol
Toluidine
Benzidine, etc., etc.

PHOTOGRAPHIC CHEMICALS:

We are prepared to undertake the design of suitable equipment for the manufacture of para-amido-phenol, diamidophenol, metol and other photographic chemicals and to direct the operation of processes for the successful manufacture of all these substances.

PYROXYLINE SOLVENTS:

We are prepared to furnish expert advice with regard to the manufacture of pyroxyline solvents, amyl-acetate, butyl-acetate, ethyl-acetate. Formulæ supplied for the various lacquers and bronzing liquids.

PLANTS FOR MAKING VEGETABLE EXTRACTS:

We are in a position to design, erect and operate complete plants for the making of vegetable extracts of all kinds, including:—

Logwood extract
Tanning extracts
Licorice, etc.

These plants embody the most modern design and are adapted to the extraction of a great variety of substances.

DYE STUFFS:

We are prepared to give expert advice with regard to the manufacture and use of dyestuffs of all kinds, including natural organic dyestuffs, mineral dyestuffs and artificial organic dyestuffs. Our experience covers the use and manufacture of

Indigo
Logwood
Prussian Blue
Khaki
Aniline Colors
Alizarine Colors
Sulphur Colors
Eosines
Rhodamines
Aniline Black
Azo Colors, etc.

SULPHITE PULP:

The design and erection of complete plants for the production of sulphite pulp, including the recovery of all by-products, especially gums, and the manufacture of adhesives therefrom.

BY-PRODUCT COKE OVENS:

Our engineers have had extensive experience with by-product coke ovens and gas producers.

GENERAL CHEMICAL PLANTS:

Plants embodying modern method of construction designed for the manufacture of sulphuric, hydrochloric, nitric and acetic acids. Also plants for the manufacture of formic, oxalic, gallic, pyrogallic and other organic acids. Plants for the manufacture of synthetic, pharmaceutical and photographic chemicals, etc.

Continued on Next Page

MIXING MACHINES:

Mixers for heaviest doughs, lightest liquids or powders.

We do not illustrate any machines because all our mixing machinery is designed by our engineers to suit special conditions. Experience has shown that the mixing and incorporating problems of the various branches of chemical industry are so diverse that no line of stock machines could possibly be completely satisfactory.

Our engineers in charge of this Department have had great experience in the designing of kneading, mixing and incorporating machinery for meeting various sorts of conditions and are prepared to design installations to handle the following products among others:

- Celluloid
- Artificial Silk
- Viscose Products
- Pencil and Crayon mass
- Carbon Electrodes
- Carbon masses
- Dry Battery Filler
- Storage-Battery Filler
- Rubber
  - Rubber Compounding (dry)
  - Rubber Solutions and Doughs
- Chewing Gum
- Fertilizers
- Bread Doughs
- Photographic Film mass
- Putty
- Smokeless Powder
- Cordite
- Ground Wood
- Sulphite Fibre
- White Lead
- Paper Pulp

Although we do not manufacture stock machines, our experience covers the following general types of kneading, mixing and incorporating machinery.

(1) Kneading machines.
(2) Mixing machines with crushing action.
(3) Mixing machines without crushing action.
(4) High-speed mixers.
(5) Low-speed mixers.
(6) Mixers with heating and cooling arrangements which can be maintained accurate to within a few degrees of any desired temperature while the mixing or incorporating process is going on.
(7) Vacuum mixers.
(8) Appliances for mixing, kneading and impregnating materials and then withdrawing solvent under vacuum, the whole series of operations being carried on in one apparatus.
(9) Machines for drying certain compounds which tend to form into cakes while being dried and hence cannot be handled in ordinary dryers. These machines turn out a dry finished product of any required degree of fineness, thus obviating the necessity of pulverizing materials after their removal from rotary or dissolving dryers.
(10) Machines for mixing and sifting powders.

We are prepared to furnish estimates for plants of this kind on request. Please give as explicit information as possible and wherever possible, send samples of raw materials and finished products together with samples of intermediate stages if any. These samples and accompanying information will be treated as confidential.

We are prepared to install apparatus for dissolving all kinds of crystals, salts, clays, dyes, paper size, kaolin, glue, alkalis, etc. As the requirements under which these machines work are very diverse, each installation is based on a study of the particular conditions to be met. Our engineers have had experience with economically and efficiently getting into solution a great variety of substances and we feel confident that we can build and install equipment of this kind to meet all the needs of the various chemical industries.

MANUFACTURE AND USE OF FERRO ALLOYS:

The engineers in charge of our metallurgical department have had extensive experience with the manufacture of ferro alloys including ferro-manganese, ferro-molybdenum and ferro-vanadium, both in the electrolytic furnace and by other means. We have worked out special methods for the addition of these materials to steel which are more economical than those in ordinary use. We are prepared to give advice with regard to the design and erection of plants for the manufacture of ferro alloys and also for the manufacture of special steels.

ELECTRIC FURNACES:

We design and erect electric furnaces for the melting of precipitates from cyanide plants and also amalgamation sponge. Special furnaces for the reduction of lead and tin dross, brass turnings, scrap metal, etc. Our experience with electric furnaces also includes the melting of ferro alloys for use in the making of steel and the melting of a great variety of ores many of which will not yield readily to any other method of treatment. Special furnaces for the treatment of cobalt sponge, nickel sponge and nickel oxide.

These furnaces are supplied in all sizes from those handling only a few hundred pounds per day to those taking a charge of several hundred tons per day. We are prepared to make tests at reasonable charges to be refunded on the placing of an order for equipment. We are always pleased to enter into correspondence with regard to the adapting of any of our equipment to special purposes, and the number of difficult problems which our engineers have successfully solved in the past is our best assurance that we will be able to provide a successful solution of these problems.

ORE CONCENTRATION:

We are prepared to investigate problems dealing with the concentration of ores, also to erect ore concentrating and smelting plants, especially in cases where it is necessary to resort to hydrometallurgical methods of treatment. We are prepared to design installations for the preparation of finished products from the ores of tungsten, molybdenum, vanadium, radium and other rare elements. We will be pleased to enter into correspondence with regard to the solution of problems pertaining to the concentration of such ores and the working of them up into finished products.

REMODELLING OF PLANTS:

We are prepared to submit estimates on the remodeling of plants both to render them more efficient in the line of manufacture in which they are at present engaged and also to suggest new lines of manufacture to which they can be built in place of lines which have become unprofitable. Our experience in this line is unique and extensive.

LABORATORY:

In our laboratories will be found every facility for the development of chemical ideas. We are prepared to investigate processes with regard to their commercial practicability; to investigate the utilization of by-products and the recovery of values from waste; substitution of cheaper materials for rare materials which have become over-expensive or impossible to obtain; the general improvement of the efficiency of the plant.

WRITE US ABOUT YOUR PROBLEMS.

THE CARBORUNDUM COMPANY

—Factories—

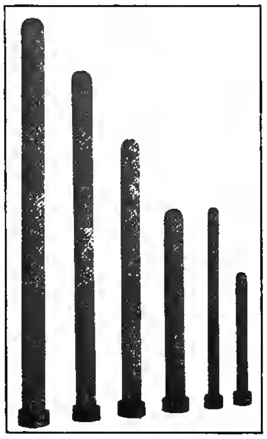
TRAFFORD PARK, Manchester, Eng.
NIAGARA FALLS, N. Y.
REISHOLZ b. DUSSELDORF, Germany

Branch Offices: NEW YORK BOSTON PITTSBURGH CHICAGO PHILADELPHIA CLEVELAND CINCINNATI LONDON MILWAUKEE GRAND RAPIDS
Agencies in all cities.

PRODUCTS: Carborundum, Silfrax, Pyrometer Protection Tubes, Silfrax Muffles, Refrax, Carbofrax, Carborundum Firesand, Abrasives and Refractories.

PYROMETER PROTECTION TUBES. SILFRAX, REFRAX, CARBOFRAX:

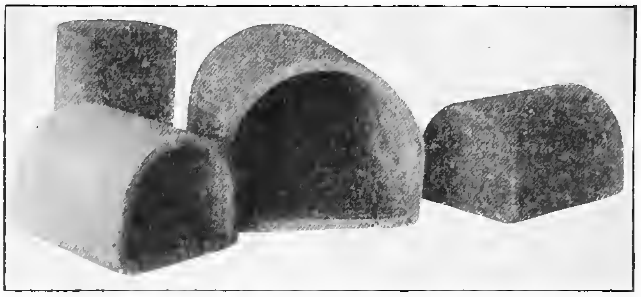
These tubes possess all the unique properties of Carborundum; due to their great refractoriness these tubes cannot be melted; their low coefficient of expansion allows them to be used when changes of temperature are encountered. Their resistance to slagging makes them a valuable protection for thermo couples in metallurgical work. Their high conductivity assures a minimum lag and error in the pyrometer reading.



Pyrometer Protection Tubes

SILFRAX MUFFLES:

These muffles possess the refractoriness of Carborundum and are quite free from tendency to crack and disintegrate. They make possible more uniform temperatures and show economy in gas. They are especially suitable for optical work, assaying and other high-temperature work where muffles possessing this combination of properties are essential. Supplied in small sizes.



Silfrax Muffles

REFRAX:

A Carborundum refractory made up in the form of bricks, tubes, etc. Used extensively for the electric furnace, roof linings and under extreme temperature conditions.

CARBOFRAX:

A Carborundum refractory suitable for temperatures up to 1600° C. Used in the form of brick, muffles, tubes, etc.

CARBORUNDUM FIRESAND:

The standard high-temperature refractory for brass furnace linings and cements.

The Carborundum Company, Niagara Falls, N. Y.

CARRIER AIR CONDITIONING CO. OF AMERICA

490 Broadway **BUFFALO, N. Y.**

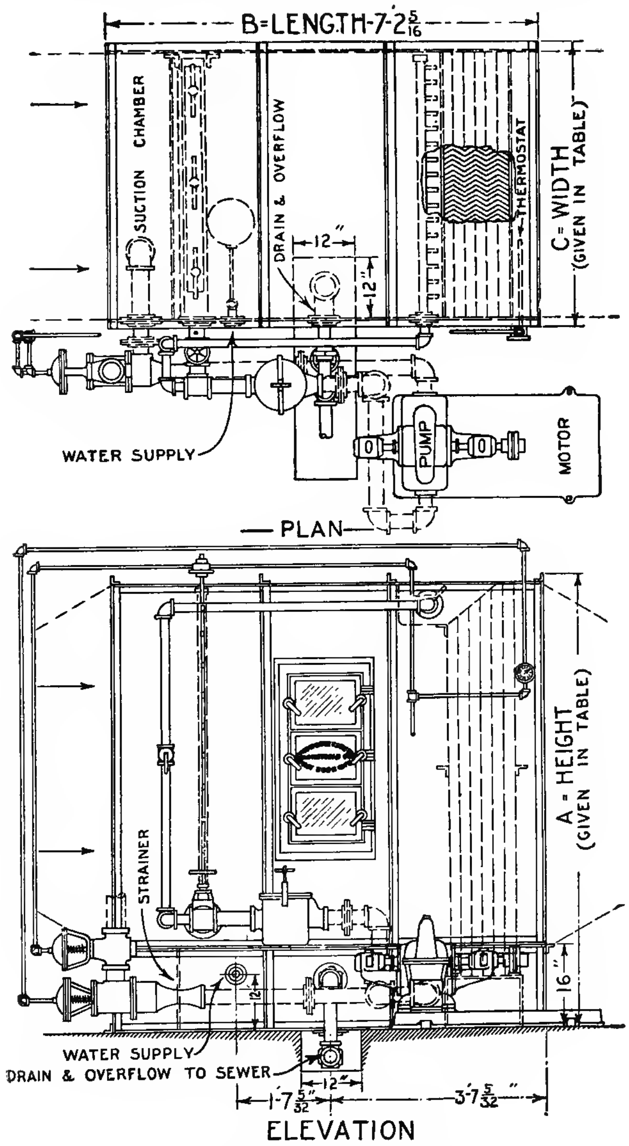
PRODUCTS: Carrier Air Washers and Humidifiers; Dew Point or Absolute Humidity Control; Spray Nozzles and Cooling Systems; Generator Coolers and Filters.

TYPES OF MACHINES:

While all of our air washers embody the same general principles, we have found it necessary to develop and standardize machines varying in detail for the various classes of service to be performed.

RESEARCH LABORATORY:

This Company maintains a corps of competent engineers continuously on research of experimental work. Every possible phase of air-conditioning that we have been able to conceive has been or is to be investigated.



Carrier Type "A" Washer

TYPE "A" CARRIER AIR WASHER AND HUMIDIFIER

TURBO GENERATOR COOLING:

Nearly all of modern turbine driven generators are provided with a fan built into and forming a part of the generator itself.

If the air used for ventilating a turbo-generator is first passed through a Carrier Generator Humidifier and Air Washer, its temperature will be reduced from 10 to 20 degrees and cleaned of dust which would otherwise be deposited in the winding. Besides avoiding constant cleaning, the output of the generator may be increased from 10 to 18 per cent.

The increased capacity would actually result in a net saving of several thousand dollars and, in addition, clean air for ventilation would be procured.

INDUSTRIAL BUILDINGS:

Where ventilation is needed, without attendant troubles from dust Carrier Air Washers in connection with ventilating fans will make the air supply, though taken from a source where dust is prevalent, entirely suitable for laboratories, offices or general purposes. Our system of automatic control provides a summer climate in winter.

SPECIFICATIONS

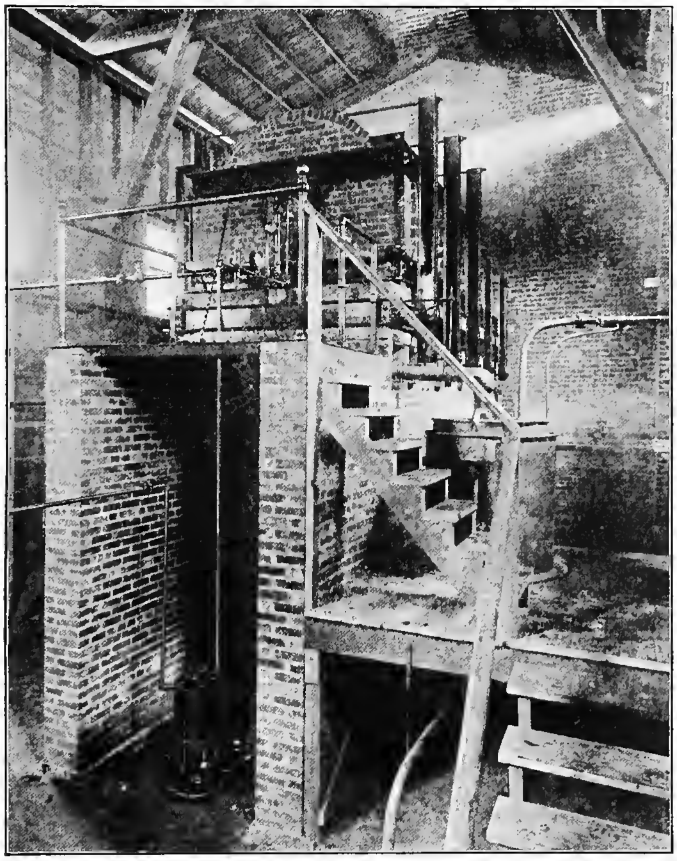
Number	Capacity in C. F. M.	Height A Ft. Ins.	Length B Ft. Ins.	Width C Ft. Ins.	G. P. M. Circulated	Size Pump Ins.	H. P. Motor	R. P. M. Motor	Water Supply Ins.	Sewer Connec. Ins.
1-A	1500	4-1½	7-2 5/16	1- 5¼	14	1½	2	1700	¾	2
1-B	2100	5-1½	7-2 5/16	1- 5¼	16	1½	2	1700	¾	2
2-A	3100	4-1½	7-2 5/16	2- 9	28	1½	2	1700	¾	2
1-C	3200	7-1½	7-2 5/16	1- 5¼	23	1½	2	1700	¾	2
2-B	4400	5-1½	7-2 5/16	2- 9	32	1½	2	1700	¾	2
3-A	4800	4-1½	7-2 5/16	4- 0¾	42	1½	2	1700	¾	2
4-A	6400	4-1½	7-2 5/16	5- 4½	56	1½	3	1700	¾	2
3-B	6700	5-1½	7-2 5/16	4- 0¾	48	1½	2	1700	¾	2
2-C	6900	7-1½	7-2 5/16	2- 9	46	1½	2	1700	¾	2
4-B	9000	5-1½	7-2 5/16	5- 4½	63	1½	3	1700	¾	2
2-D	9400	9-1½	7-2 5/16	2- 9	57	1½	3	1700	¾	2
3-C	10500	7-1½	7-2 5/16	4- 0¾	69	1½	3	1700	¾	2
5-B	11300	5-1½	7-2 5/16	6- 8	79	2	3	1700	¾	2
4-C	14100	7-1½	7-2 5/16	5- 4½	92	2	3	1700	¾	2
3-D	14300	9-1½	7-2 5/16	4- 0¾	85	2	3	1700	¾	2
5-C	17700	7-1½	7-2 5/16	6- 8	115	2	5	1700	¾	2
3-E	18100	11-1¾	7-2 5/16	4- 1¼	102	2	5	1700	¾	2
4-D	19200	9-1½	7-2 5/16	5- 4½	114	2	5	1700	¾	2
6-C	21300	7-1½	7-2 5/16	7-11¾	139	2½	5	1700	¾	2
5-D	24100	9-1½	7-2 5/16	6- 8	142	2½	5	1700	¾	2
4-E	24300	11-1¾	7-2 5/16	5- 5	135	2½	5	1700	¾	2
6-D	29000	9-1½	7-2 5/16	7-11¾	171	2½	5	1700	¾	2
4-F	29400	13-1¾	7-2 5/16	5- 5	164	2½	5	1700	¾	2
5-E	31000	11-1¾	7-2 5/16	6- 8½	169	2½	5	1700	¾	2
7-D	33900	9-1½	7-2 5/16	9- 3½	200	2½	7½	1700	¾	2
6-E	36700	11-1¾	7-2 5/16	8- 0¼	204	2½	7½	1700	¾	2
5-F	37000	13-1¾	7-2 5/16	6- 8½	205	2½	7½	1700	¾	2
8-D	38800	9-1½	7-2 5/16	10- 7¼	228	3	7½	1700	¾	2
7-E	42900	11-1¾	7-2 5/16	9- 4	238	3	7½	1700	¾	2
9-D	43700	9-1½	7-2 5/16	11-11	256	3	7½	1700	1	2

Made in standard types, "B" and "C," differing slightly from "A" ("B" longer and "C" shorter), and other types for special purposes. Details sent upon application.

CHEMICAL CONSTRUCTION COMPANY

CHARLOTTE, N. C.

PRODUCTS: Concentrators for Sulphuric Acid and Phosphoric Acid; Glover Towers; Gay-Lussac Towers; Intermediate Towers; Denitrating Towers; Acid-Proof Masonry containing no Lead; Acid-Proof Brick; Packing Material; Acid Pumps; Acid Fans; Nitric Acid Plants; Constructing Chemical Engineers.



SULPHURIC ACID CONCENTRATOR

ACID CONCENTRATORS:

The acid concentrators designed and built by the Chemical Construction Company represent the most modern and approved methods of construction. They are constructed of acid-proof masonry, eliminate all pans, and in this way promote efficiency by reducing charges for repairs, waste and attention. In fact, operation being once started, these plants require almost no attention.

They will yield concentrates up to 98 per cent as required and yield a perfectly white acid. They can be cleaned while in operation. Efficiency, durability, and simplicity have been aimed at in designing these concentrators which are different from any other type of concentrator on the market.

ACID-PROOF MASONRY CONSTRUCTION

"ACIPRUF" CEMENT:

The cement used by the Chemical Construction Company is prepared according to a special formula which has never been successfully imitated and which withstands the action of acetic, nitric, phosphoric, hydrochloric and sulphuric acids. This cement is no longer for sale on the open market and is only used in the plants designed and constructed by the Chemical Construction Company.

When used in the construction of Acid-Proof Masonry this cement is not affected by acids, and becomes as hard and tenacious with use as does the acid-proof brick itself, and in this way makes lead casings unnecessary.

CONSTRUCTION:

As Chemical Engineers for the construction and operation of Acid Towers, Acid Tanks and Chemical Plants, the Chemical Construction Company can be of great service to the manufacturer as they have built a number of the most successful plants in America.

Profitable acid manufacture begins with the foundation and extends into every detail of the construction and operation of the plant, and at the present time includes many questions involving the use of the product. Whether contemplating building or enlarging, the progressive methods of construction employed in Chemical Construction Company plants should interest the manufacturer.

TOWERS:

All towers erected from designs prepared by the Chemical Construction Company are entirely built of Acid-Proof Masonry and hence are free from the usual objections to which towers constructed of lead held up by structural steel or timber work are open. This feature together with the advantages of the designs for towers used by the Chemical Construction Company makes them particularly desirable in modern plants.

COATESVILLE BOILER WORKS

Builders of Steel Tanks and Boilers

PHILADELPHIA
Morris Building

Main Office and Works
COATESVILLE, PA.

NEW YORK
30 Church St.

PRODUCTS: Acid Tanks, Fuel Oil Tanks, Storage Tanks for all purposes; Pneumatic Tanks, Pressure Tanks, Brine Tanks, Coal Tar Tanks, Grease Tanks, Hydro-Pneumatic Tanks, Molasses Tanks, Turpentine Tanks, Gasoline Tanks, Oil Stills, Oil Tanks, Jacketed Tanks, Filter Tanks, Settling Tanks, Soap Tanks, Sugar House Tanks, Water Softening Tanks, Lime Storage Tanks, Linseed Oil Tanks, Varnish Tanks. Horizontal Return Tubular Builers, Coatesville Patented Vertical Boilers, Waste Heat Boilers. Digestors, Rendering Tanks. Dryers, Steam-Jacketed. Dryers, Direct-Fire. Condensers, Cylinders, Ladles, Penstocks, Riveted Pipe. Stacks, Stand Pipes, Troughs, Vulcanizers, Steel Tanks for all manufacturing processes requiring same.

TANKS—STOCK SHIPMENTS:

Capacities from 4500 to 14,000 gallons each. These tanks are of different thicknesses, suitable for Acids, Oils, etc. They are caulked inside and outside and are exceptionally well constructed throughout, each provided with dished heads, longitudinal seams double rivetted and suitable for pressure work. Each tank provided with one manhole and three pipe openings.

It will be to your advantage to consider our prices, specifications and deliveries if you contemplate purchasing Steel Tanks.

BOILERS, HORIZONTAL RETURN TUBULAR:

Shipment from stock can be made of standard sizes, that is, from 85 to 250 H. P. Each boiler is built and stamped in strict accordance with the A. S. M. E. rules, which insures heavier shell plates, tubes and the best of materials throughout.

VERTICAL BOILERS:

Secure our bulletin No. 18 thoroughly illustrating and describing in detail the Coatesville Patented Vertical Boiler, which boiler has a number of special features that have commended themselves to our customers. All sizes up to 60 H. P. in stock ready for immediate shipment.

DRYERS:

Our Steam-Jacketed Dryer is built for 100 pounds working pressure and without stay bolts; during the drying process this dryer is practically sealed, so that a jet condenser can be used to good advantage. Our Direct-Fire Dryers are 5′ 6″ diam. by 40′ and 24′ long; they are heavy with ample provision for expansion and contraction.

MISCELLANEOUS STEEL PLATE CONSTRUCTION:

Our shops are large and well equipped with machinery for fabricating heavy steel plate; they are next adjoining two large plate mills and thus we are able to make prompt shipments.

As this goes to print we have a large assortment of stock materials for Tanks, Boilers, Stacks and miscellaneous work. Your inquiries, large or small, will be given prompt attention.

Each Tank Approximately 15,000 Gal. Capacity

Telephone Call, 5465 Worth

ESTABLISHED 1857
INCORPORATED 1907

Cable Address, COCTION, New York
(A, B, C, Code, 4th and 5th Ed.)

CHAS. COOPER & CO.

Manufacturing Chemists and Importers

194 Worth Street, NEW YORK
Near Chatham Square

Works at Newark, N. J.

PRODUCTS: A full line of Technical and Medicinal Chemicals, a few of which we list below. Chemically pure Sulphuric, Nitric and Muriatic Acids a specialty.

Acetone
Acid
  Acetic
  Boracic
  Carbolic
  Carbonic (liquefied)
  Chromic, pure
  Chromic, for batteries
  Citric
  Gallic
  Hydrocyanic (Prussic)
  Hydrofluoric
  Hydrofluoro, Silicic
  Muriatic (Hydrochloric)
    20° technical
    Chemically Pure, 20° Be.
  Nitric
    Chemically Pure
    Technical 36°, 38°, 40°, 42°
  Oleic, or Red Oil, technical
  Oxalic, technical
  Phosphoric, anhydrous
  Phosphoric, glacial
  Pyrogallic
  Sulphuric
    Chemically Pure
    66° (Oil of Vitriol) technical
    Electrolyte, sp. gr. 1.250
    For battery purposes
  Sulphurous, technical
  Sulphurous, liquefied anhydrous
    Tartaric
Alcohol, Absolute
Alcohol, Wood
Alum
Alum, Chrome
Aluminum Chloride
Ammonia
Ammonium Chloride
Amyl Acetate
Arsenic, powdered white, technical
Barium Chloride and other Salts
Benzol
Borax
Bromine U. S. P
Calcium Chloride
Carbon Bisulphide
Charcoal, Animal
Chloroform
Cobalt Chloride
Copper Salts
Collodion
Dextrine
Ether, Sulphuric
Ethyl Chloride
Formaldehyde, technical, 38–40%
Gold Chloride
Hydrogen Peroxide
Iodine
Iron Salts
Lead Salts
Lithium Salts
Magnesium Carbonate
Magnesium Oxide
Manganese Oxide and Salts
Mercury, Metallic
Mercury Salts
Nickel, Metallic and Salts
Paper, Filtering
Paper, Turmeric
Platinum Bichloride
Potassium Salts
Pumice Stone, ground
Silver Nitrate
Soda Ash
Sodium Salts
Stearine
Strontium Salts
Sugar of Lead (Lead Acetate)
Sulphur Flour, Flowers and Roll
Sulphur Chloride
Tannin
Tin Chloride
Uranium Nitrate and other Salts
Zinc Salts

Send for Price List and let us figure on your requirements.

CORNING GLASS WORKS

MAIN FACTORY AND OFFICE, Corning, N. Y.
NEW YORK OFFICE, 18 East 41st Street
Address all Communications to Corning
Established 1868

PRODUCTS: Glassware, mainly for Technical Requirements.

BAKING WARE:

Casseroles, plates, pans, etc. Also oven door plates, percolator flasks and tops; made from a low expansion borosilicate glass of unique properties, marketed under the trade-mark "PYREX."

BATTERY JARS:

For primary or storage cells in Corning "NONEX" (low expansion heat resisting) glass only; also Jars for Leyden cells.

BULBS:

All types of standard bulbs, also special bulbs for X-ray apparatus.

CANE:

Solid rods, clear or colored, for lamp-working.

CHEMICAL GLASS WARE:

Beakers, flasks and other laboratory ware exclusively in PYREX glass.

CHIMNEYS:

For gas or oil lamps in NONEX glass only.

CYLINDERS:

In all diameters and lengths according to specifications from either lead or PYREX glass.

HEADLIGHT GLASSES:

Prismatic or plane front glasses for auto headlights in clear or NOGLARE (yellow) tint; plane or convex for arc headlights in NONEX glass.

LANTERN GLOBES:

In NONEX glass, clear and all standard colors.

LENSES:

Molded in a great variety of designs and sizes for Railway Signal Service, Marine Service, etc. Standard colors are Red, Yellow, Green, Blue, Purple and Lunar White, also clear glass. (The Corning Glass Works maintain the only laboratory in the world devoted to the study of signal glass and signal lenses.)

LIGHT FILTERS:

Glasses of special spectral absorption or transmission, such as:

Daylite, No. G 172 CD, for production of artificial daylight, very accurate with Nitrogen filled lamp. Noviol, No. G 38 D, total absorption of ultra-violet. Noviweld, No. G 39, in various shades for protection against excessive illumination in arc welding and similar processes. Ultra, No. G 120, high transmission of ultra-violet. No. G 11 F, high transmission of X-rays. No. G 24, absorption of all visible spectrum except red.

OPTICAL GLASSES:

Of special refractive indices and dispersion for lens-grinding, including lime crown glass of 1.523 index, lead flints of 1.6165 and 1.68 index,—also standard colors such as Amber, Smoke, Fieuzal, Amethyst, etc.; see also Light Filters above.

PYREX:

A recently developed extraordinarily low expansion borosilicate glass. Pyrex satisfactorily replaces porcelain and quartz glass for many purposes because of its low linear expansion coefficient (25° to 350° C = 0.0000032). The simple chemical composition of Pyrex is an advantage as regards possible contamination of liquids in contact with it. It contains no metals of the magnesia-lime-zinc group and no heavy metals.

Aside from Chemical ware and Baking ware, this glass is used for a great variety of special purposes, such as evaporating dishes, special flasks, etc.

TUBING:

Including all varieties of Thermometer and Barometer tubing, Brewer, Clinical, Placque, etc., in standard lead glass, also in Corning Normal and Corning Borosilicate Glasses. Special tubes for acid condensers, for laboratory service, for lamp working, etc.

X-RAY SHIELDS:

Glasses of special composition for protection against X-rays.

Corning Glass Works have made the production of technical glassware their special field for fifty years. They maintain the most fully equipped laboratory in the world devoted to the study of the technical problems of glass manufacture. The results of research conducted in Corning Glass Works have revolutionized some very important industries during the past twenty years. We stand ready to cooperate with any manufacturer by developing special glasses to meet the particular requirements of his service if our present list does not afford exactly what is needed. The service of our chemists and physicists is at your disposal. Our designers can determine how to prevent unnecessary expense and how to secure maximum efficiency by avoiding unsuitable designs.

Address the SALES DEPARTMENT, Corning, N. Y., for information, price lists, descriptive circulars, etc.

ESTABLISHED 22 YEARS

A. DAIGGER & COMPANY

52-54-56 West Kinzie Street
CHICAGO, ILLINOIS

Importers, Manufacturers and Dealers

CHEMISTS' SUPPLIES

SPECIALTIES:

HYDROMETERS
THERMOMETERS
SPECIAL DESIGNS
APPARATUS IN GLASS,
  METAL, RUBBER. FIBRE
  OR WOOD
THIS ORGANIZATION
  IS EQUIPPED TO MANUFACTURE
  ANY SPECIAL
  APPARATUS FOR GENERAL
  LABORATORY WORK

TESTING INSTRUMENTS:

ASPHALT (PENETROMETERS, ETC.)
BACTERIOLOGY (BIO-CHEMICAL)
CALORIMETERS (BOMB TYPES)
CEMENT (MOULDS, NEEDLES, ETC.)
COLOR TESTING (TINTOMETERS)
DISSECTING (SURGICAL, ETC.)
ELECTRO-CHEMICAL (CATHODES and ANODES)
FIRE PROTECTION (COMPLETE EQUIPMENTS)
GAS ANALYSIS (BURETTES, PIPETTES)
HÆMATOLOGY (HÆMOCYTOMETERS)
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JENA WARE (Beakers, Flasks, etc.)
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MILK TESTING (Complete Installations)
NITROGEN EQUIPMENT (Digestion shelves)

APPARATUS FOR WORK IN

OIL TESTING (Viscosimeters, etc.)
PAPER TESTING (Complete Installation)
PHYSICAL CHEMISTRY
  (Measuring Instruments)
PYROMETRY (Every known Model)
QUARTZ WARE (Fused and Transparent)
RUBBER TESTING (Complete Installation)
SPECTROSCOPES (All Imported Models)
THERMOMETRY
  (Domestic and Foreign Instruments)
UREOMETRY (Representative Latest Models)
VACUUM (Domestic and Foreign Equipment)
VINEGAR TESTING (Complete Installation)
VISCOSIMETRY (Latest Models)
WATER TESTING (Accurate Nessler Cylinders)
WINE ANALYSIS (Distillation Testing Apparatus)
XYLOGRAPHY (Every Known Type)
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ZEISS WARE (Direct Importations)

REPRESENTATIVE STOCK CARRIED IN:

J. T. BAKER'S ANALYZED
BAKER & ADAMSON'S
MERCK'S REAGENTS
  and
COMMERCIAL CHEMICALS
BALANCES and WEIGHTS
PLATINUM WARE—ANY SHAPE
AMERICAN and IMPORTED GLASSWARE

This Company caters especially to Colleges, Schools, Institutions and Industrial or Commercial Laboratories.

THE J. H. DAY COMPANY

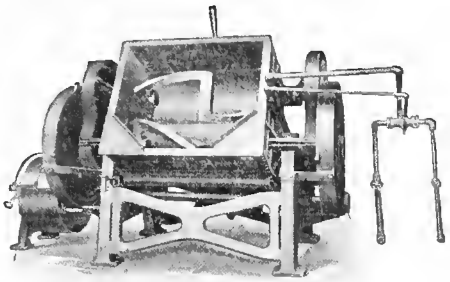
1144 Harrison Ave.
CINCINNATI, O.

Branches:
NEW YORK, BOSTON, PHILADELPHIA, BUFFALO, CHICAGO, KANSAS CITY

Factory and Main Office:
CINCINNATI, OHIO

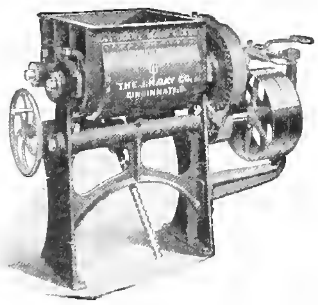
PRODUCTS: Mixers, Kneaders, Grinders, Sifters, Blenders, Emulsifiers, Disintegrators, Package Fillers, Kettles, Percolators, Racks, Trucks, Tanks and Special apparatus for handling Dry, Liquid, Powder, Granular, Dough and Paste Materials. Made water-cooled or jacketed and with Galvanized or Enameled Tanks when required.

HEAVY PASTE AND DOUGH MIXER



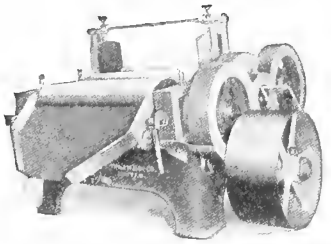
4 SIZES. CAP. 50, 70, 110, 220 GALS.

HEAVY MASS MIXER:



CAP. 30 TO 40 LBS.

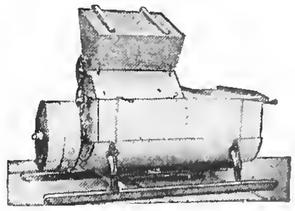
THREE ROLL PIGMENT AND PASTE MILL



ROLLS: 5″ x 12″, 12″ x 32″, 16″ x 28″, 16″ x 40″

SIFTER AND MIXER

This illustration represents our Sifter and Mixer for mixing flour, dry paints and colors in large quantities, cements, etc., or any kind of dry powdered or granular material. They are made of heavy boiler steel, and Sifter of heavy oak or ash, oil finished. They are made to have both Sifter and Mixer used on one floor, or by using heavy Iron Arms, which we furnish, the Sifter can be placed on top of floor and Mixer swung under it, thus occupying less space.

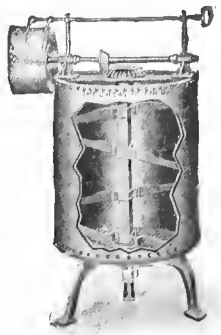


13 SIZES. CAP. 8 TO 5000 LBS.

STEAM JACKETED KETTLE

For cooking and heating any liquid or paste material that requires constant stirring, such as polishing materials, varnish, gums, etc. Kettle made of best boiler steel with a 2-inch jacket space around sides and bottom. Shaft of steel with wrought iron mixing blades. A 2-inch draw-off in bottom of kettle.

Variations in agitators can be made to suit customers.

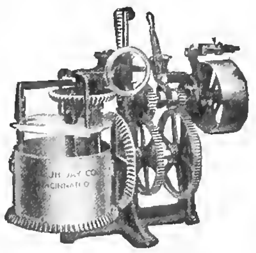


10 SIZES. CAP. 20 TO 1000 GALS.

LIQUID AND THIN PASTE MIXER

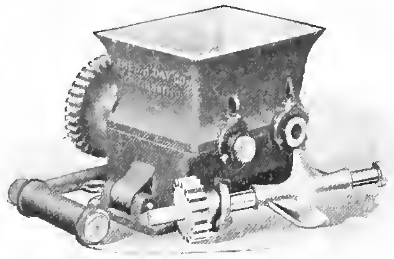
For small batches of Ink, Paste Paints, Tooth Paste, Ointment, Massage Cream, and all Paste Preparations, this machine is highly recommended. A special device locks the arm holding the blades when let down into can, giving perfect rigidity. Blades and can are revolved in opposite directions, causing a quick and thorough mixture. Cans are interchangeable and made of heavy galvanized sheet iron, with handles.

A device to scrape side of tank will be fitted on machine when desired.



4 SIZES. CAP. 2½, 8, 15, 40 GALS.

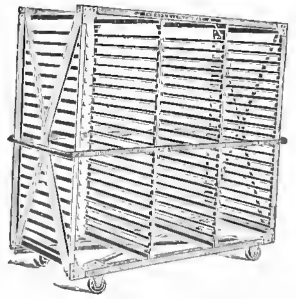
KNEADER AND MIXER:



SIZE NO. 1. CAP. 2½ QUARTS

A good machine for mixing any heavy mass in small quantities. Steel blades. Hand power.

DRYING AND CONVEYING RACK



DIMENSIONS AS REQUIRED

THE DE LAVAL SEPARATOR COMPANY

NEW YORK CHICAGO SAN FRANCISCO SEATTLE
MONTREAL PETERBORO WINNIPEG VANCOUVER

PRODUCTS: Centrifugals.

THE CENTRIFUGAL PRINCIPLE

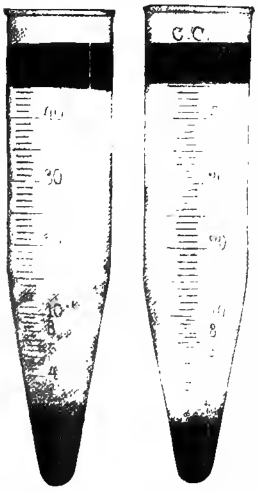
Before describing the De Laval Process it is well to offer this broad definition of centrifugal force as utilized in this type of apparatus:

Centrifugal force acts like gravity but with many times its force. It brings about an almost instantaneous separation or sedimentation of liquids or liquids and solids having different specific gravities.

It has been demonstrated that many products requiring days, weeks, or even months to separate or settle by the action of gravity, and other products which, owing to their viscous nature or the very slight degree of difference in their specific gravities, might *never* separate or settle of themselves, will separate or "settle out" almost instantly when subjected to the powerful action of machines employing the centrifugal principle.

CENTRIFUGAL FORCE VS. GRAVITY:

To show the relative results of gravity settling and separation by centrifugal force, two test bottles, side by side, are shown herewith. Each bottle contains the same quantity of the same mixture, which is composed of lubricating oil and water with a small amount of sand.



Illustrating the Relative Results of Gravity Settling and Centrifugal Separation

The bottle at the left had stood undisturbed for 24 hours. It will be observed that ordinary gravity settling has produced a separation practically identical with that of the bottle at the right hand side, which was placed in a centrifuge and subjected to strong centrifugal action for a period of *one minute*. The ingredients in each case have assumed positions regulated by their relative specific gravities. It will be noted, however, that centrifugal action has produced a separation more clear-cut and complete as indicated by the distinct lines of demarcation. Graduations on the bottles make it possible to determine the proportions, showing 1 per cent. solids at the bottom, 90 per cent. water next above, and 9 per cent. oil at the top.

THE CENTRIFUGE:

The centrifuge set in motion for this experiment is a true centrifugal separator of the most simple type. Engineers use it to determine to what extent a liquid will respond to centrifugal action. In the De Laval laboratories, a self-contained steam turbine rotates the centrifuge to any desired speed up to 4,000 revolutions per minute. Materials of different specific gravities are separated into more or less distinct strata, the heavier at the bottom, the lighter at the top.

In the De Laval Special Centrifugals liquids are clarified in steel cylinders or bowls that revolve 6,000 or more revolutions per minute. Centrifugal force brings about the separation. The material to be treated enters at the top of the bowl, passes down and by means of discs is separated into thin layers and subjected to powerful centrifugal action, which causes the ingredients having the greater specific gravity to be carried to the outside while those of less gravity are forced toward the center. All liquids are then forced upwards to one or more discharge points at the top—just outside the passage which is used in conveying the material into the bowl. If there are solids heavier than the liquids present in the mixture, they are deposited in compartments provided for that purpose against the outer wall of the bowl.

CENTRIFUGALS CLASSIFIED:

De Laval Centrifugals divide themselves into four classes, as follows:

First, for Separating.

A machine which separates and continuously discharges a lighter from a heavier liquid. Only two discharges are provided for; consequently should a product be composed of three or more ingredients, liquids of different specific gravities, two or more of the ingredients would be mixed as they emerged from the discharge spouts. This would necessitate a further operation to bring about a final separation of each liquid by itself. In this class of machines, it is presumed that the liquids treated contain but a trace of solids, if, in fact, they contain any at all.

Second, for Clarifying.

A machine which "clarifies" or separates solids from the liquid in which they are suspended. It has but one discharge, that for the liquid to escape, while the solids are retained in the sediment space provided in the bowl.

Third, for Separating and Clarifying.

A machine which is in fact a combination of classes one and two in that it both separates and clarifies at the same time. There are two discharges of liquids while the solids are retained in the bowl.

Fourth, for Clarifying and Filtering.

A machine of class two type with a filter on top of the clarifying chamber for removing particles of matter so light that they will remain suspended. This filter also removes other particles of solid matter so minute that centrifugal pressure does not readily separate and deposit them with the heavier solids. In the process of filtering, the liquid, already passed through the clarifying chamber and freed of heavy solids, is forced up through a separate compartment containing filtering material, arranged in horizontal layers, which catches and removes the suspended bodies.

Centrifugal force in two ways works to assist this filtering operation; first, by producing a considerable pressure in the clarifying compartment, which forces

Continued on Next Page

the liquid through the filter material; and second, by throwing off and removing the matter deposited on the filtering surfaces. This latter action not only materially increases the life and efficiency of the filtering material, but makes possible and easy the filtering of certain products which contain gums or flocculent matter. If allowed to remain on the filtering surface, such gums or flocculent matter would soon tend to form a seal, clogging up the machine.

Any one of the above classes of centrifugals, while to a certain extent standardized, is subject to modifications to meet the peculiarities of a new product or produce results to satisfy individual demands.

SIZES AND PRICES:

Each class of centrifugal has been developed in three or more sizes, ranging from the smallest, which is used largely for laboratory work, to as large as good practice permits. It is manifestly impossible to state capacities of any size until the product to be handled is fully known. Prices from $150.00 up.

FIELDS FOR ADAPTATION:

The foregoing facts should shed some light on the possibilities of De Laval centrifugal separation now so little understood by the majority of American manufacturers who make liquid products which must be clarified before being placed on the market. Thousands of these special centrifugals are already in service. The field for their further adaptation is such a wide one that manufacturers who have liquids to filter, to separate or to clarify, should investigate the De Laval Process of Centrifugal Clarification. De Laval methods often succeed where cruder methods of filtration and clarification fail. Classes of material which present strong possibilities of centrifugal separation by the De Laval Process follow:

(a) VISCOUS PRODUCTS:

Products of a viscous nature, such as certain kinds of varnishes, waxes, oils, etc., which do not yield to gravity separation. Nor can such materials be handled to advantage, if at all, by other filtering methods.

(b) HIGH PRICED MATERIALS:

Products which, though responding in time to gravity or that may be filtered by other methods, represent too much investment to permit tying up money to wait for gravity, or when the loss due to absorption in other filtering processes is too great. In this class would come flavoring extracts, gums, essences and pharmaceuticals; also expensive varnishes and kindred products when handled in small quantities.

(c) BULKY PRODUCTS:

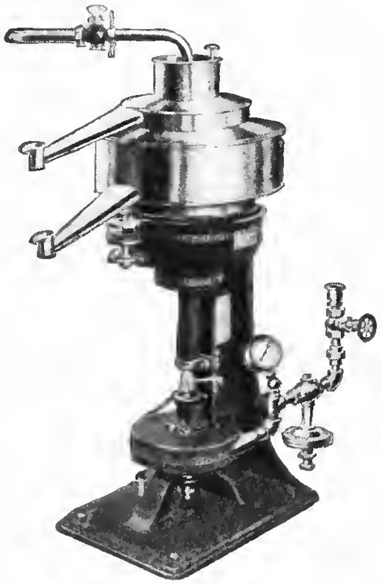
Products such as lubricating oils, dry cleaning oils, creosote, dyestuffs, etc., each of which may be comparatively easy to clarify even by gravity, but on which the quicker centrifugal process is profitable through saving of floor space, housing and tankage expense.

(d) PERISHABLE PRODUCTS:

Products such as yeast, blood, fish oil and many others, which must be quickly separated or clarified to prevent rapid degenerative action.

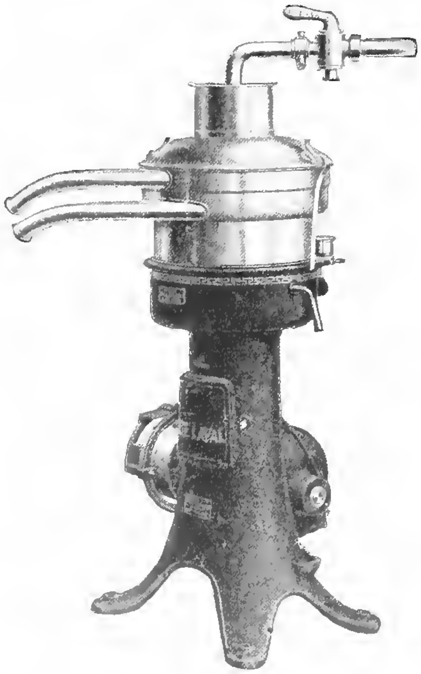
(e) CORROSIVES:

Products which will corrode metals used in filter presses and accessories with which they come in contact, but which the De Laval machines, on account of the small area of contact, may readily be protected against by special treatment in the way of platings, etc. In this class will be found citrous fruit juices, acid and alkaline solutions, etc.



TURBINE STYLE DE LAVAL CLARIFIER AND FILTER

This machine is of the clarifying and filtering class described above. It is made in three sizes and with either belt power or steam turbine drive.



DE LAVAL OIL RECLAIMING OR DEHYDRATING CENTRIFUGAL

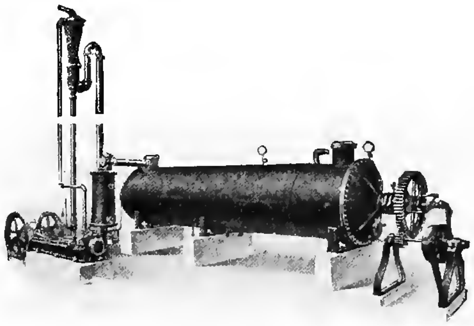
One type of the separating class: Made in five sizes with either belt power or steam turbine drive.

J. P. DEVINE COMPANY

Main Office and Works
BUFFALO - - NEW YORK

New York Office: 42d Street Building
London: James Livingston Ltd.

PRODUCTS: Autoclaves, Drying Machinery, Evaporators, Stills, Nitrating Kettles, Sulphonating Kettles, Impregnating Apparatus, Vacuum Pans and Complete Plants for the Manufacture of Phenol, Coal Tar Derivatives, Colors, etc.



DEVINE VACUUM ROTARY DRYER

For any and all materials that will not be affected by tumbling or mixing. Best adapted for granular substances, such as Starch, Dextrine, Sago, Sugar, Corn, Cereals, Beer and Distillery Grains; Noxious Smelling Materials, such as Fish, Guano, Artificial Manure and By-Products of Chemical Manufacture, etc.

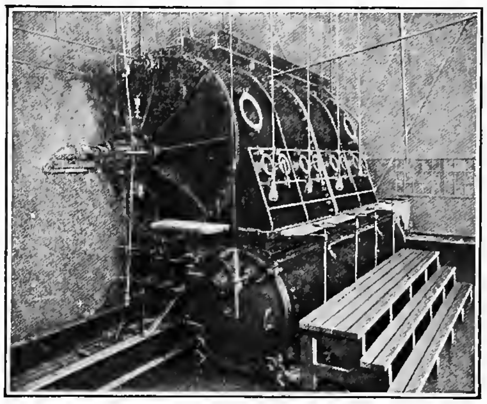
DEVINE VACUUM ROTARY DRYER:

The material to be dried, in moist form, is conveyed by means of an elevator, or otherwise, to a hopper above the manhole of the dryer to facilitate the loading of the apparatus. After charging, the manhole is closed and by means of a Devine High Efficiency Condenser and Vacuum Pump, furnished as part of the equipment, a high vacuum is pulled, the vapors passing into the condenser and condensed.

The chamber of the dryer proper acts as a receiver for the material and the outer cylinder is steam jacketed. Concentric with the steam-jacketed outside cylinder is a revolving inside drum, heated by live or exhaust steam to which stirring blades are attached. The material being between this inside drum and the outside cylinder and kept in constant motion by the stirring blades comes into intimate contact, periodically, with the heating surfaces, and a very thorough and even drying results.

By means of a special device, small samples may be taken from the apparatus occasionally, without breaking the vacuum, or interrupting the work, so as to ascertain the exact stage of the drying. This makes a continuous drying unit and does away with the necessity of shutting down, as in some types, to find out the stage of drying that the material has reached. After the proper drying time has elapsed and the unit shut down, the dried material is allowed to drop out of the apparatus by its own gravity, either into sacks or into a conveyor so arranged as to bring the dried material to its proper destination.

If larger quantities have to be dealt with, the periodical charging and discharging can be easily overcome by having the unit equipped with a special automatic device, which allows for continuous operation.



DEVINE VACUUM DRUM DRYER

For all solutions and liquids containing solids, Vacuum Drum Dryers are peculiarly adapted and used with great success for the drying of Salt Solutions, Alkaline and Neutral Lyes of chemical works, Sulphate of Zinc, Nitrate of Ammonia, Dyewood and Tannin Extracts, Glue Solutions, Albuminous Substances, Milk, Yeast, Blood Serum, Pastes, Eggs, Vegetable and Meat Extracts, White Lead, etc.

DEVINE VACUUM DRUM DRYER:

Vacuum Drum Dried materials are insured of a rapid and uniform drying, independent of climatic conditions, free from dust and dirt and uniform, because of the method applied in bringing the wet material into direct contact with the heating medium. This is made possible by spreading the wet material, by our patented process, over a specially constructed steam or hot water heated polished drum in a thin film 1-125th of an inch (or less) thick. The liquid material is charged into the chamber of the machine acting as a receiver and the drum, operating at a speed best suited for the material being handled, takes up this thin film as it revolves. The conduction of the heat through the metal drum to the material on its surface is very rapid and thorough, insuring the proper drying in the one revolution, when the material is removed and delivered to one or more receivers placed conveniently below.

As part of a complete unit a high efficiency vacuum pump and condenser are furnished, exhausting the vapors from the drying chamber proper and insuring the maintenance of a high vacuum, making possible the drying of the material at a low temperature.

It is well known that the greater the difference in temperature between two materials that are placed near each other the more rapid is the passage of the heat from the warmer to the cooler; so, if by means of a high vacuum, the moisture in the material is kept at a low boiling point, the heat from the steam is transmitted much quicker than if the boiling point be 30° or 40° higher. Even though the drum be heated by steam 230° F., the solution being dried cannot get warmer than its boiling point under the vacuum, because the heat is utilized in turning the water into steam as soon as the material is at its boiling point, thereby causing a most rapid evaporation of the water out of the drying material, notwithstanding its low temperature.

These units are built in a great many sizes, all with a special view to low operating cost and a minimum of attendance, small floor space, low power consumption and a maximum production of even and uniform material.

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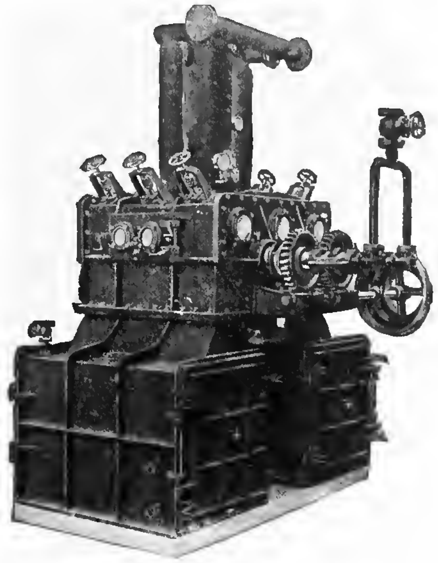


DEVINE VACUUM DOUBLE DRUM DRYER

Vacuum Double Drum Dryers are, like the Vacuum Single Drum`Dryers, adapted for the handling of all liquids and solutions containing solids, emulsions, thick liquids and pastes, and are used when such solutions are handled that will not readily adhere to the heating drum, and must be pressed on same in the form of a thin film.

DEVINE VACUUM DOUBLE DRUM DRYER:

The Vacuum Double Drum Dryers are constructed on similar lines to the Single Vacuum Drum Dryer excepting that instead of one drying drum, two are used. Instead of the drums dipping into the material and taking up a film, the liquid material to be dried is fed into a patented hopper, above and between the two rolls, which in turn causes the material to form a uniform and even coating upon the rotating drums.

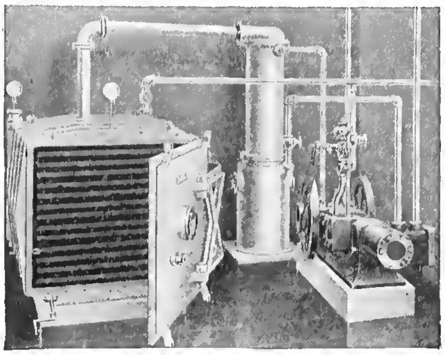
Due to their close clearance and the rotating drums being adjustable, we are able to form the proper film on them, so that in one revolution the material is dried, and when nearing the complete turn is taken off, in the form of powder, by a patented adjustable knife device, and dropped into receivers placed in such a position as to catch all of the finished product.

Briefly, the apparatus consists of a cast-iron outer casing, in some cases tinned on the inside, or lined with copper or other suitable metal, and having at the bottom a suitable trough with conveying device, so as to return to the feeding hopper above the rolls, any of the material that was not taken up by the revolving drums. Inside of this casing revolves the hollow drums made of cast iron, gun metal or bronze, and equipped with our special device for draining the condensed water, while rotating, so as to secure a maximum of efficiency from the heating medium, and to insure an even distribution of the heat to the drum. The outer surface of this drum is carefully machined, balanced and polished, and is heated internally by steam or hot water.

The inlet supply is regulated so that the solution within the casing remains at a constant level. Our patented shield rings prevent the material from coming in contact with the ends of the drum, thereby doing away with end scrapers.

We also own and control patents for cooling and agitating the liquor or solutions inside of the outer casing, thereby preventing foaming or overheating of the material being dried, also the proper agitation of materials that have a tendency to precipitate.

The dry material drops into dry material receivers, or into a conveyor, which in turn brings the material to any convenient point, for storage or packing, thus making the plant one of continuous operation.



DEVINE VACUUM CHAMBER DRYER

For all Materials that can be handled on Pans or Trays. Best adapted for Aniline and other Dyes and Colors, Extracts, Salts, Sheet and Reclaimed Rubber, India Rubber, etc., Pastes, Glues, Soap, Gluten, Starch, Resins, Milk Chocolate and Biscuits, Vegetables and Fruits, Fish, Candied Peels, Refined Sugar, Smokeless Powder and High Explosives, Incandescent Mantels, Electric Cables, Armatures and Magnet Coils, Accumulator Plates, Solutions of Gum, White Lead, a variety of Chemical and Food Products, etc.

DEVINE VACUUM CHAMBER DRYER:

The Vacuum Drying Chamber is designed to remove the water rapidly and at low temperature from materials which cannot be dried by methods used heretofore without altering their chemical composition on account of their sensitiveness to heat.

The Dryer consists of a cast-iron chamber, which is closed hermetically at one or both ends by large doors. It contains a number of steam and water-tight heating shelves placed one above the other through which steam or hot water is circulated to produce the required degree of heat. The material to be dried is placed on these shelves in trays made of suitable shape and material.

The shelves have welded seams and are made strong enough for a test pressure of 100 pounds.

After the trays containing the material have been placed on the shelves and the door has been closed, a high vacuum is created by means of an air pump, while exhaust or live steam or hot water passes through the heating shelves.

Owing to the high vacuum in the Chamber, the water evaporates briskly out of the material at a low temperature, causing it to dry rapidly.

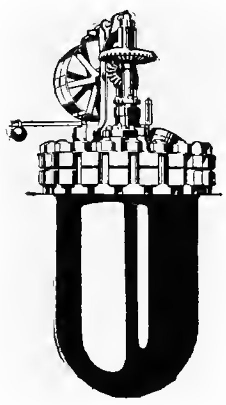
Materials which are difficult to dry in the atmosphere, or which cannot be dried at all in the atmosphere without decomposition, have all moisture removed from them in a very short time in the Vacuum Chamber without the least danger of imparing their character by overheating.

The charging of the Chamber is simple and easy, the operation very clean and reliable. The temperature is regulated by valves in the steam pipes. Vacuum and steam gauges and thermometers always indicate the exact conditions existing in the Chamber. The drying process is absolutely certain and is independent of climatic conditions.

Continued on Next Page

AUTOCLAVES:

We are specialists in the building of autoclaves, required for the chemical and allied industries, and can furnish cast-steel autoclaves in sizes having holding capacities ranging from ¼ gallon to 500 gallons. They are fitted with cast-steel covers, having all the necessary openings, and each one fitted with pressure gauge, safety valve, and equipped with a thermometer tube. They are built with or without stirring devices, and each fitted with a syphon discharge tube for the rapid removal of the liquid being handled. A quick-opening device for charging is fitted in the cover of each Devine Autoclave, thus facilitating the rapid loading of the unit.



HIGH PRESSURE STEEL AUTOCLAVE

In the larger and commercial units, where stirring devices are specified, we provide tight and loose pulley for direct belt drive and a rigidly supported cut bevel gear and pinion and such an agitator or paddle best suited. A specially-designed stuffing-box is fitted on each autoclave provided with a stirring device, which prevents leakage, thereby insuring a tight joint where the shaft comes through the cover.

Devine Autoclaves are equipped, when desired, with silver, platinum, copper, lead, tin or porcelain linings, fitting closely to the interior of the body and cover, and are also provided with removable liners of cast iron, steel, bronze, earthenware, etc., and are enameled where necessary.

Sheet steel supports are furnished, as well as a complete heating arrangement, for the maintaining of any temperature, heating with either fuel oil or gas. Provisions are also made for heating by direct coal fire.

Where a very high, uniform and constant temperature is required, the autoclave is fitted with an auxiliary jacket of steel, cast iron or cast steel, in which a molten lead bath is maintained. Lead baths are provided where temperatures exceed 600° F., but when temperatures ranging near 400° F., are necessary, then autoclave is fitted with the Devine Patented Hot Oil Circulating System. The above statements are general, for we recommend careful study of existing requirements to determine the client's exact needs.

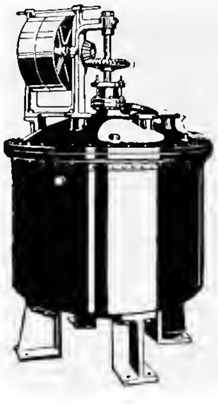
Bronze and copper autoclaves are also furnished, in all sizes and capacities, with necessary openings in the cover, each unit being fitted with a pressure gauge, safety valve and thermometer tube. These types are furnished with or without stirring device, as required.

NITRATING KETTLES:

We have a standard line of these units ranging in sizes from five (5) gallons to five hundred (500) gallons, each equipped with stirring device, bevel gears, tight and loose pulley and cover having all the necessary openings. A sheet steel jacket is furnished through which oil, steam or water can be circulated. Where desired an internal cooling cylinder is provided

SULPHONATING KETTLES:

These units are made in a variety of sizes and are similar to the Devine Nitrating Kettles described above. Each unit is equipped with a powerful agitator, fitted with a sheet steel jacket for the circulation of steam or hot oil.



DEVINE NITRATING KETTLE

REDUCTION KETTLES:

Made in standard sizes equipped with powerful rake stirring device and with cover having all of the necessary openings, thermometer and charging funnel. The interior of the kettle is lined with sectional removable cast-iron slabs, so arranged that they can be removed and renewed through large manhole, thus eliminating the necessity of removing the cover. Each reduction kettle is fitted with a special patented discharge valve.

FUSION KETTLES:

Made in all sizes for any requirements ranging from laboratory units to the largest commercial outfit. Each unit is fitted with a cover, arranged in a sheet steel support lined with fire-brick and equipped with a fuel oil burner. The kettle proper has a flat inclined bottom and is provided with a special discharge on the side, at the lowest point. A powerful blade stirring device with tight and loose pulley and bevel gears completes the equipment.

COMPLETE PLANTS BUILT AND INSTALLED:

For the production of Aniline Oil, Benzol, Beta Napthol, Paranitraniline, T. N. T., Salicylic Acid, H. Acid, Naphthalene, Dimethylaniline, Dimethyldiphenyl Urea, Sulphur Black, Direct Black, Acetanilid, Benzoic Acid, Dianisidine, Victoria Blue, Violet Blue, Prussian Blue, Acetic Anhydride, Benzaldehyde, Phenacetine, Hydroquinone, Metol, Toluidine, Gamma Acid, all of the Coal tar derivatives, the higher intermediate colors and dyestuffs, etc. Also Logwood Extract Plants, By-Product Coke and Gas Plants, Ammonia and Benzol Recovery Apparatus and Tar Distillation Plants for the recovery of Creosote Oils, Benzol, Toluol, Carbolic Acid and Anthracene Oils.

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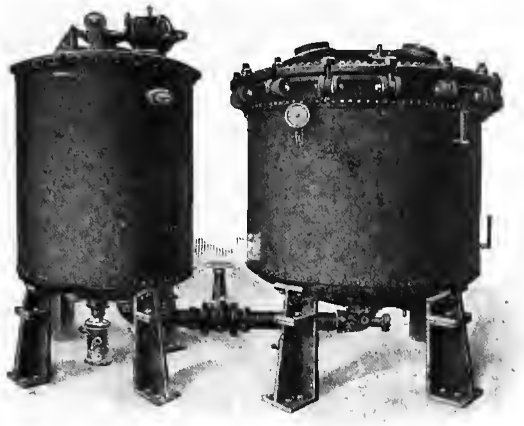


DEVINE VACUUM DRYING AND IMPREGNATING APPARATUS

DEVINE VACUUM DRYING AND IMPREGNATING APPARATUS:

For Armature, Field, Magnet and Transformer Coils, Power and Telephone Cables, Insulator Pins, Piano Sharps, Pencil Slats and Other Wood Products, Leather, Fabrics, Etc., and for water-proofing various materials.

This Apparatus consists of a Drying and Impregnating Chamber (either steam-jacketed or heated with a spiral steam coil), a Liquor Tank (also steam-jacketed or containing spiral heating coil) for the storage of and to liquefy the compound, and steam-jacketed connecting pipes with special steam-jacketed valve

The Impregnating Chamber and Liquor Tank are constructed of sheet steel with cylindrical and vertical seams welded; the ring at top of shells and cover are of the best grade of cast steel. The coil, when supplied, is of extra heavy welded wrought-iron pipe.

The Apparatus is mounted with steam, vacuum and pressure gauges, and flanged connections for steam, vapor and drainage lines, and is equipped with cast-iron bearing stands welded to the bottom or brackets on the cylindrical part when to be located between floors.

In connection with the Impregnating and Liquor Tanks, we supply a Condenser of proportionate capacity, and our specially designed Combined Vacuum Pump and Compressor; this pump is guaranteed to obtain and maintain a vacuum within a ¼ inch of barometer, with a blank flange on its suction side.

The coils or material is first placed in the Impregnating Tank and dried under vacuum, thereby removing both air and moisture from the interior as rapidly as from the surface, and at a temperature that prevents any deterioration of the material to be insulated. While still under vacuum, the compound is drawn into the Impregnating Tank; the air and moisture having been removed from the material, the compound at once penetrates its innermost recesses and, to render the penetration more thorough, air at artificial pressure is admitted into the Impregnating Tank above the surface of the compound.

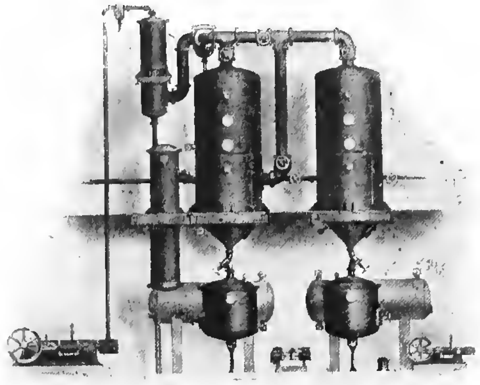
The Devine Vacuum Drying and Impregnating Apparatus is manufactured in standard sizes suited for all materials and the size recommended depends entirely on just what is to be impregnated and the quantity per day.

Owing to our method of construction, special sizes can be supplied for every requirement.

The Cable Dryer is fitted with steam coils and is arranged with rails for carrying the heavy pieces, such as cables on drums, etc., by means of trucks or trolleys, and can be made any length or diameter to suit the exact conditions or dimensions and quantity of material to be dried in a given time.

No steam joints or pipe connections inside of the Apparatus.

Highest quality of the dried product obtained.



DEVINE HIGH EFFICIENCY EVAPORATORS

DEVINE HIGH EFFICIENCY EVAPORATORS:

Single and Multiple Effect units of all sizes and capacities.

For handling Caustic Liquors,
Chemical Liquors of all kinds,
Extracts, Glycerins, Sweet Water, Milk and Food Extracts, Logwoods, etc., etc., etc.

Our Vacuum Evaporators and Pans are designed to insure maximum efficiency, at a minimum cost of operation. In their design and construction, the rule of thumb has been discarded, and for each requirement, the size and type of apparatus is carefully selected, based upon the best results obtained in actual practice, combined with such improvements as experience demonstrates.

Our experience in the building of evaporators in copper, cast iron, sheet steel, etc., has been very extensive and it is with pride that we can point to a great many installations that are in daily successful operation, ranging over a period of many years.

In the construction of our evaporators, great stress is laid on securing the most rapid and intense circulation of the liquors, as only by such a circulation can all particles of the liquid come into contact with the heating surface, thus securing the quickest concentration without overheating the material. Special care is likewise given to metal of which the heating tubes are to be constructed, as well as to the lining, to resist acids and to prevent incrustation.

The Advantages of a DEVINE EVAPORATING APPARATUS are many, a few of which are:

1. Minimum steam consumption.
2. Simplicity and rapidity of operation.
3. Elimination of loss by frothing or foaming.
4. Highest obtainable vacuum, with consequent lowest possible boiling temperature.
5. Durability of apparatus.
6. Economy in the replacement of heating tubes.
7. Greater capacity and uniformity of product.

Vacuum pans of copper, cast iron, sheet steel, etc., of all sizes and capacities for any service.

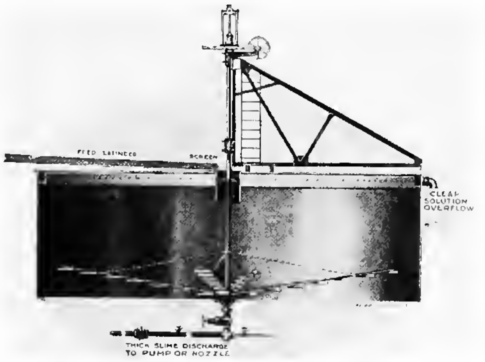
Cable Addresses
"DORRCLASS" NEW YORK
"DORR" DENVER
"CYANDORMAC" LONDON
Codes
BEDFORD-McNEILL
WESTERN UNION

THE DORR COMPANY

ENGINEERS

NEW YORK
17 Battery Place
DENVER
1009 Seventeenth St.
LONDON
16 South Street

PRODUCTS: Apparatus for Classifying, Dewatering, Settling, Washing and Agitating. We have developed machines that are extensively used for the above purposes and are prepared to undertake research work along these lines.



THE DORR CONTINUOUS THICKENER

affords a means whereby the operation of settling finely divided solids may be made continuous.

The Thickener consists of a slow moving mechanism made up of a central vertical shaft driven by a worm gear and worm, the shaft having radial arms attached to its lower end. These arms carry plow blades set at an angle which, through the rotation of the mechanism, move the settled material to a discharge opening at or near the center of the tank. The mechanism is usually placed in a comparatively shallow flat bottomed tank or basin. The feed enters continuously at the center of the tank, and a peripheral overflow trough collects the clear liquid.

The underflow, containing the thickened solids, is preferably controlled by a diaphragm pump.

Capacity: Depends upon the physical nature of the material to be handled, the temperature and the dilution of the feed and thickened discharge and is largely a function of area.

Thickeners are in use in tanks from 6′ to 130′ diameter handling from 2 to 1500 tons of solids daily.

THE DORR TRAY THICKENER, of which several types have been developed, furnishes means for multiplying the settling capacity without increasing the floor space required.

OPERATING COSTS:

Power: Less than ½ H.P. for tank up to 40′ diameter.
Repairs: Not usually over $5.00 per year.

Applications: The Dorr Thickener is handling a wide range of products, from silicious material ground through forty mesh screens which can be discharged containing 30% to 40% moisture to precipitated ferric hydrate and the lightest of finely divided organic material.

Where dilute pulps have to be filtered, prior thickening multiplies the capacity of the filter and reduces the cost of treatment.

Though originally designed for thickening slime in the cyanide process it has been adopted almost universally in North America in wet concentration and flotation mills for thickening pulp, concentrates and tailings.

Continuous Counter-Current Decantation: using Dorr thickeners, is a means of thoroughly washing finely divided solids and is illustrated by the following flow sheet dealing with the manufacture of Caustic Soda solutions from Soda Ash and Lime, which materials, together with liquor overflowing from No. 2 Thickener, are run continuously to the first of a series of three Dorr Agitators, in which the chemical reaction takes place. The flow through these is continuous and the resulting mixture passes to Thickener No. 1, in which the calcium carbonate is settled and removed as a thick mud in the underflow, while the clear solution of Caustic Soda overflows. The thick underflow passes through the next two Thickeners in succession, being diluted in each case by liquid which passes in the opposite direction, giving under the conditions assumed below a washing efficiency of 92%.

THE DORR AGITATOR:

The Dorr Agitator is a mechanism consisting of a vertical air lift which can be revolved by a shaft supported from the top of the tank in which it is set, and is equipped with distributing launders above the level of the liquid in the tank and plow arms at the bottom which sweep the pulp to the center. This secures uniform circulation and allows an intensity of agitation to suit the requirements of the material being treated. Means are provided for readily bringing the pulp into suspension after a shutdown.

OPERATING COSTS:

For Agitator 30′ diameter by 15′ deep.
Power: ¼ H.P.
Air: 20 cu. ft. at 15 # = 1.1 H.P.
Maintenance: not over $20.00 per year.

The Dorr Agitator or Mixer has demonstrated that continuous agitation may be used to great advantage in many chemical operations where it was formerly considered essential to work in batches. Causticizing Soda Ash with Lime is an example of this which, in practice, has resulted in a conversion of 93%, making a 15° Beaume solution, as compared with 92% in a 13° Beaume solution using batch agitation.

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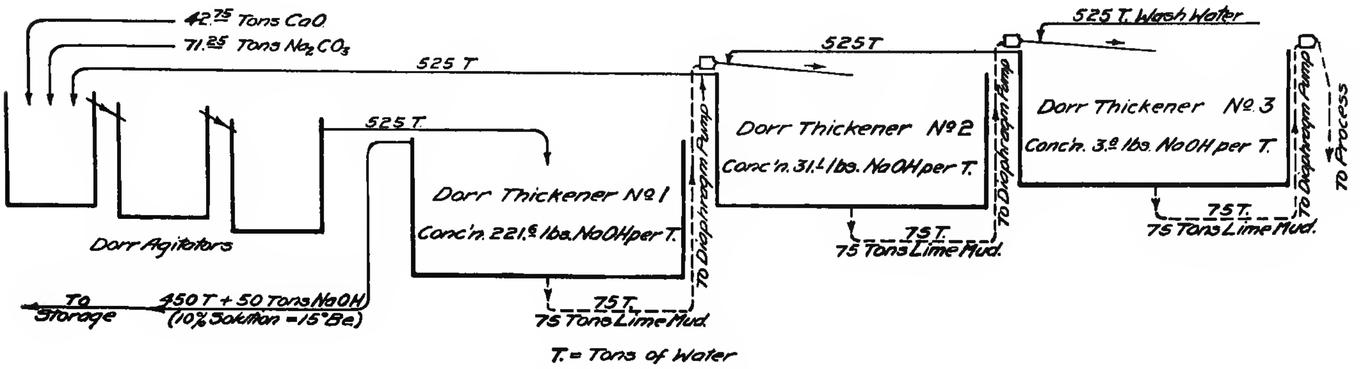
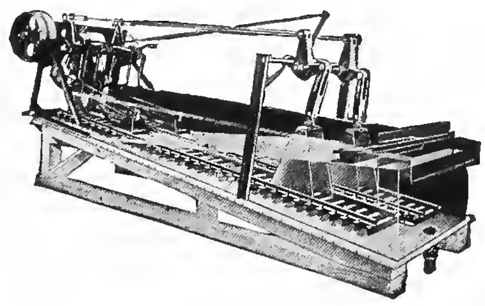


FLOW SHEET ILLUSTRATING MANUFACTURE OF CAUSTIC SODA SOLUTIONS

THE DORR CLASSIFIER:

The Dorr Classifier or Dewaterer consists of a settling tank in the form of an inclined trough open at the upper end. The feed enters near the center and the liquid and slow settling solids overflow at the closed end, while the sands or quick settling solids are conveyed along the bottom by mechanically operated reciprocating rakes and, after emerging above the liquid line, are discharged at the open end.

All parts moving on each other are suspended above the liquid.



Capacity: From 25 to 1600 tons of solids per 24 hours, depending upon size of machine used, dilution and screen test of feed, and point of separation desired.

Products: Will make a separation at from 28 to 200 mesh with sand dry enough to be carried on belt conveyor.

Regulation: By means of baffles, sprays, speed of rakes, dilution, and amount of feed.

Operating Cost: Power: ¼ H.P. per 150 tons solids.
Maintenance: .02 to .05 cents per ton solids.

Uses: Dewatering any granular product.
Separation of clay from sand.
Closed circuit fine grinding of silica, cement materials or solids of similar physical properties.
Washing sand.
Counter-current leaching and washing of granular material.

CONSTRUCTION:

Normally, all Dorr Mechanisms are built of iron and steel, and can be operated in steel, wood, concrete or other forms of tanks. Where acid liquors are used or where discoloration of a product has to be considered, all submerged parts of the machines are made of wood, lead-covered iron and steel, Duriron, Glass, Stoneware, and Bronze.

CONSULTATION:

Consultation offered upon special problems which demand investigation and research.

DRIVER-HARRIS WIRE CO.

Main Office and Works:

HARRISON, NEW JERSEY

Branches: CHICAGO, ILL.

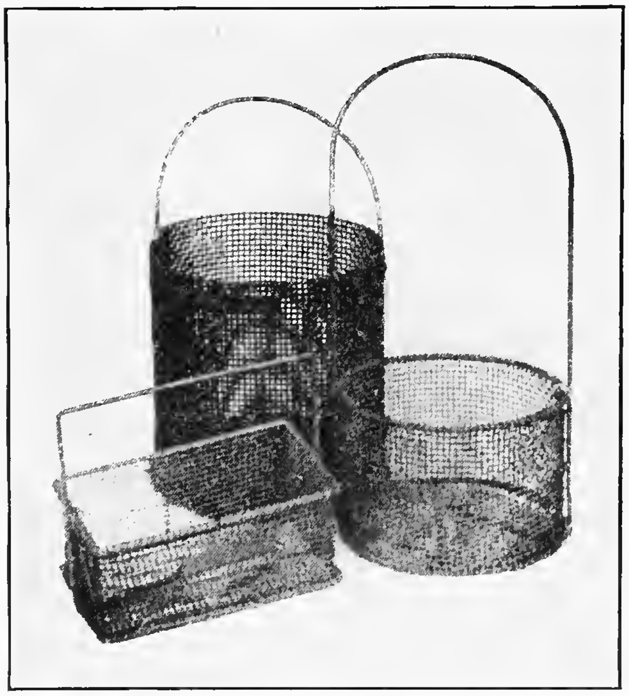
MANCHESTER, ENGLAND

PRODUCTS: Resistance Wires and Ribbons; Pure Nickel Wire, Rods, Strips; Nickel Alloy, Wire, Rods, Strips; Monel Metal, Wire, Rods, Strips; Heater Cords; Cold Rolled Strip Steel; Wire Rope, Tiller Rope and Sash Cord; Fine wire of Brass, Bronze and Phosphor Bronze.

"Nichrome" Castings, "Nichrome" Baskets, and "Nichrome" Wire Cloth.

NICHROME:

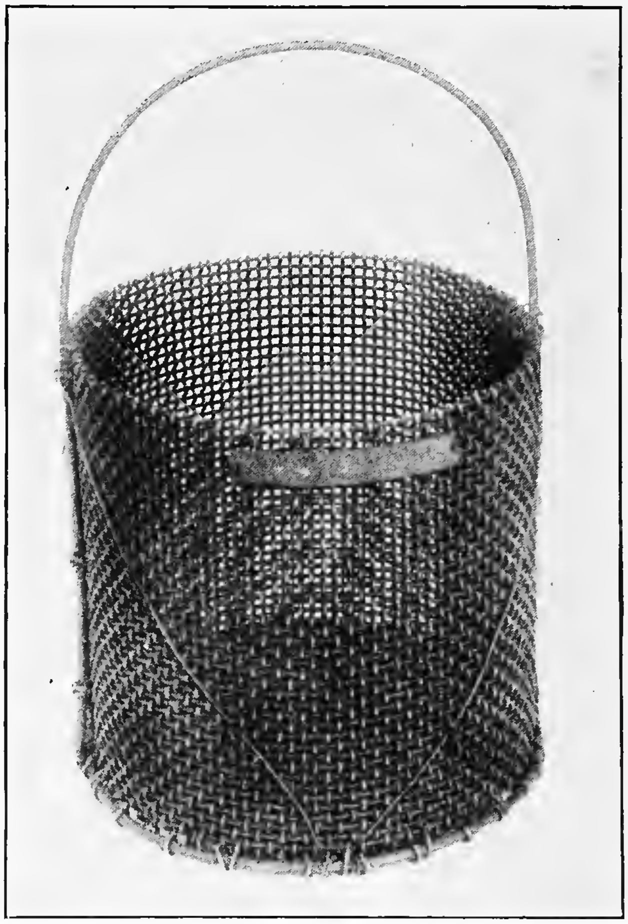
In response to the demand for a material having the strength of steel, together with the ability to resist the action of many acids or corrosive elements, as well as the effect of high temperatures, we are now prepared to furnish our "Nichrome" Alloy in the form of castings, dipping baskets, wire cloth, perforated strips, etc.



DIPPING BASKETS OF "NICHROME"

"Nichrome" dipping baskets are especially suitable for use in metal cleaning and heat treating processes. These baskets have better acid-resisting qualities and much better mechanical properties than baskets made of steel, brass, copper or aluminum. "Nichrome" made in the form of a wire basket has the ability to hold its form under a heavy load and will not go out of shape so soon as a basket made of other metals. It also is able to retain its strength under high temperatures.

"Nichrome" possesses the valuable property of retaining its shape and strength when subjected to high temperatures, and these characteristics, coupled with its ability to withstand the corroding influences of many gases and acids, make the metal an especially economical material for use in many processes of the chemical industries, for cyanide hardening, containers for heat treating, and many other applications where the most extreme conditions are to be considered.



"NICHROME" DIPPING BASKET

We make a specialty of providing baskets according to our customers' specifications and can make baskets of any size, shape or mesh desired.

We are prepared to make prompt deliveries of "Nichrome" baskets and will be pleased to quote prices upon request.

WIRE CLOTH OF "NICHROME":

"Nichrome" in the form of wire cloth has been especially developed for use in high-temperature work, and for use in the manufacture of dipping baskets.

It has been found that although "Nichrome" wire cloth, in some instances would cost twelve times as much as other kinds of wire cloth, it would give a life twenty times that of a similar product made of other metals, thereby proving much more economical to use.

We are prepared to furnish wire cloth in all meshes, made of any size wire desired, and would be pleased to submit test samples together with our prices.

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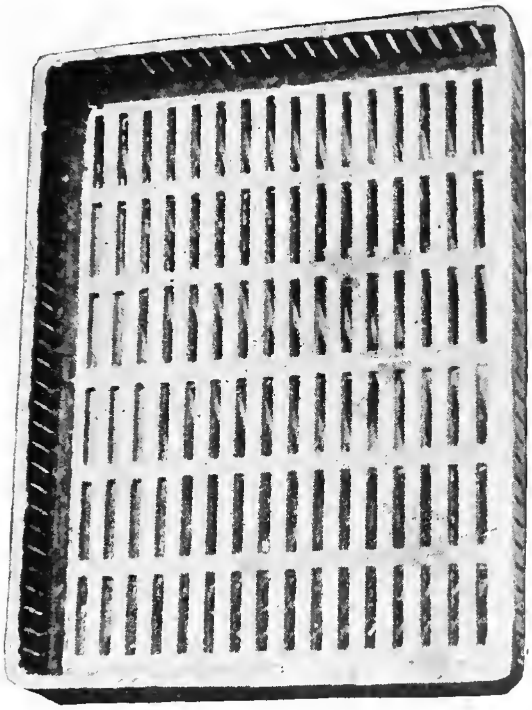
CASTINGS OF "NICHROME":

In developing our "Nichrome" in the cast form, we have met one of the most important demands of the present times. "Nichrome" castings have proven their value under extreme conditions to such an extent that we have found a very large field for this product.

We have furnished to a large number of users, pyrometer protection tubes, bars, pipes, pots, etc., made of cast "Nichrome" and are prepared to figure on your specifications for anything in this line.

Our "Nichrome" in the cast form is not brittle, and has a tensile strength of about 48,000 lbs. per square inch.



One of the new cast products of "Nichrome," which has found much favor among manufacturers, especially in the automobile industry, is the carburizing box, used for heat-treating many different kinds of steel parts.

Among the advantages of this product, over the steel or cast-iron boxes, are the following:

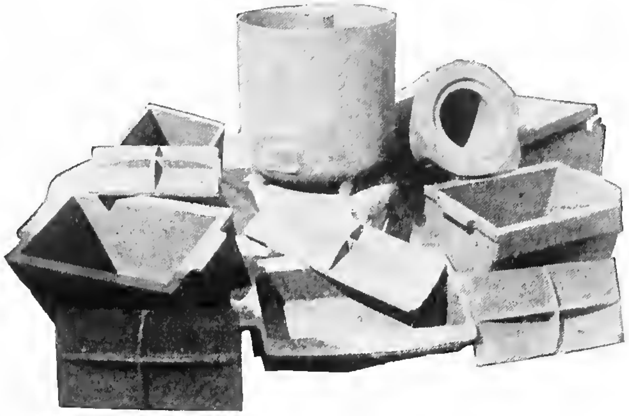
It possesses the characteristics of retaining its strength, as well as its shape, at high temperatures and does not become distorted, warp or bulge, as in the case of the iron or steel boxes.

Due to its far greater durability it may often be made one-half the thickness of the iron box and thus save considerable labor in handling. These boxes may be had with walls cast 5/16 in. to ½ in.

Due to the fact that the box retains its strength and does not bulge the capacity of the furnace and tonnage of the product treated are increased appreciably. In the case of iron boxes it is a common thing to see the box cave in or warp badly.

PYROMETER TUBES:

Among the cast products of the alloy, we find the much used pyrometer protection tube. This type of tube is now used very extensively and it is rapidly displacing the porcelain, iron or steel tube. In one case the tubes showed a life of 6000 hours.

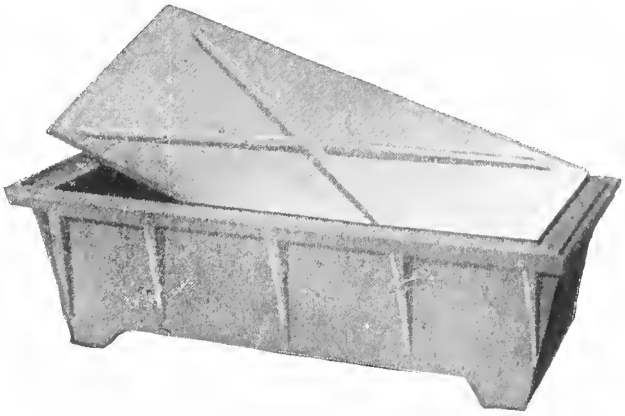


METAL CRUCIBLES:

It may be well to mention that a very interesting line of research is being conducted on metal crucibles of nichrome. Indications now are that these crucibles will very materially change the present practice in the melting of copper, brass and similar materials. Some very interesting results have been obtained from crucibles made to hold up to 175 lb. of metal and various metals have been melted to observe the effect which they had on the crucible. Brass, copper and phosphor copper have been melted, without the crucible showing any signs of deterioration. This is very important when we consider that phosphor copper has a corroding action on most all types of crucibles.

SKIMMING LADLES:

Among other interesting products which have been made is a skimming ladle to be used in connection with a brass pot. When the brass pot is poured, the ladle is held in the neck of the pot, to keep back any dross or foreign substance floating on the top. Furnace bottoms, supporting frames, furnace floors to cover the fire bricks in heat-treating furnaces and in the chains and conveying parts of the continuous furnaces are other interesting uses. Furnace nozzles for oil burning have been tried out successfully, glass molds are being experimented with and a large pot for lead hardening and cyanide hardening has also been tested and has been found to offer many advantages. Some sections of pipe 15 in. in diameter and about 12 in. long have also been made.



Nichrome can be readily machined, requiring no special tools. It has a tensile strength about twice that of ordinary cast iron and about the same hardness.

DURIRON CASTINGS COMPANY

General Offices: 90 West Street, NEW YORK

Foundries and District Sales Office: DAYTON, OHIO

Western Agents: STEARNS-ROGER MFG. CO., Denver, Colo. Pacific Coast Agents: THE YUBA CONSTRUCTION CO., San Francisco, Cal.
Canadian Agents: CHAMBERS, LTD., Toronto, Canada

PRODUCTS: Pipe and Fittings; Plug Cocks; Globe Valves; Check Valves; Safety Valves; Jets; Agitators; Ejectors; Reciprocating Pumps; Centrifugal Pumps; Exhauster Fans; Nitrating Vessels; Scrapers; Evaporating Dishes; Manifolds; Condensers; Concentrators; Cascade Systems; Special Castings.

DURIRON is an acid proof cast metal—extremely hard and close grained but not as strong as Cast Iron.

It shows a white fracture, taking and retaining a polish like nickel.

It melts at about 2500° F., does not distort until close to melting point and is very fluid in the molten state, permitting pouring into very thin sections when desirable.

Owing to the extreme hardness it is highly resistant to erosion as well as corrosion. It cannot be machined with a cutting tool but is finished by grinding, for which work we are thoroughly equipped.

PHYSICAL PROPERTIES, TABLE:

Specific gravity	7.00
Weight per cubic inch	0.253 lbs.
Tensile strength	10,000 to 12,000 lbs. per sq. in.
Transverse strength	Coefficient 900 lbs.
Compression strength	70,000 lbs. per sq. in.
Melting point	2500° Fahrenheit
Coefficient of expansion	.00001565 per deg. F.
Electrical conductivity	1/40 as great as that of standard annealed copper.

Contraction allowance in casting 3/16 to 1/4" per ft.

CHEMICAL CHARACTERISTICS:

We have on file a large number of tests showing the resistivity of Duriron to corrosion with various chemicals.

Service tests are most conclusive and we can cite many instances of continuous service for three or four years under extremely severe conditions without any appreciable effect.

We shall be glad to furnish any available data from our files or submit samples, so that you may make your own tests.

LABORATORY TESTS:

Solution	Duration of Tests	Results
25% Sulphuric Acid	One year	No loss
25% Nitric Acid	One year	15/1000 of 1% loss
14.7% Hydrochloric Acid	30 days	0.007 of 1% loss
Glacial Acetic Acid	Heated 120 hours under pressure	No loss or discoloration
Ammonia (17%) NH_3	Two months	No loss
Sodium Chloride	72 hours	No loss
25% Phosphoric Acid	Seven months	48/100 of 1% loss
Calcium Chloride	72 hours	No loss

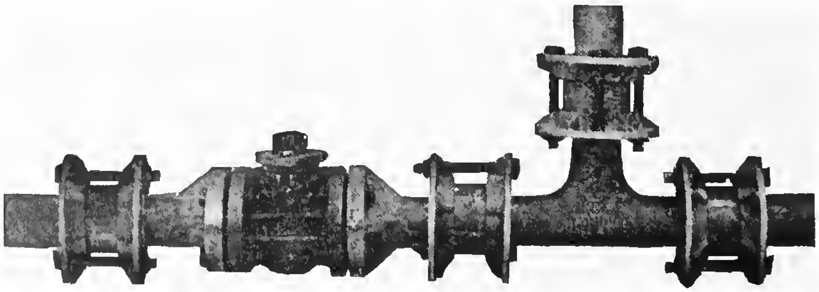
KETTLE

DURIRON is reported to be unaffected, or in some cases very slightly acted on, by Sulphate of Aluminum, Hypochlorites of Lime and Soda, Tannic and Gallic Acids, Pyroligneous Acid, Caustic Soda, Copper Sulphate, Hydrofluo-silicic Acid, Tartaric Acid, Chromic Acid, and Ammonium Chloride. As might be supposed Duriron cannot be used with Hydrofluoric Acid.

PIPE AND FITTINGS:

We manufacture all varieties and sizes of pipe, either bell, flanged or with plain ends. We recommend bell joints for low pressure and for ease of installation.

Compression couplings have the advantage of insuring a more flexible line and function as expansion joints. They are suitable for moderately high pressures. Flanged unions can be furnished in any size to connect flanged apparatus to compression lines.



PIPE WITH COMPRESSION COUPLINGS

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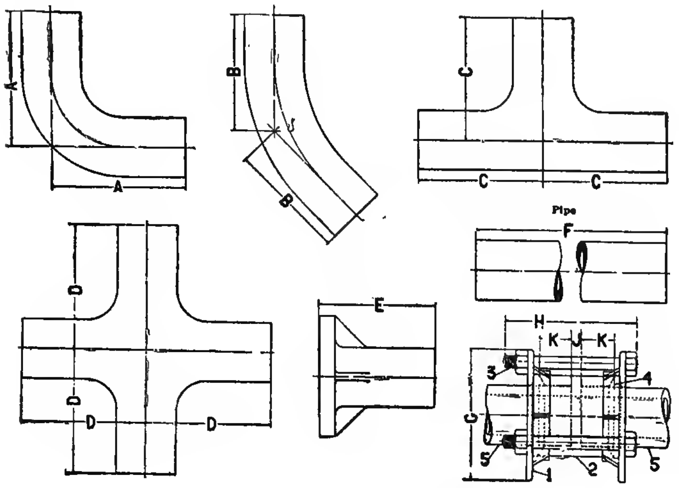
Dimensions of Plain End Fittings



Size	A	B	C	D	E
1"	4⅞"	3½"	4⅞"	4⅞"	4½"
1¼"	5 5/16"	4"	5 5/16"	5 5/16"	4¾"
1½"	5 9/16"	4⅝"	5 9/16"	5 9/16"	5¼"
2"	6⅛"	5⅝"	6⅛"	6⅛"	5¾"
2½"	6¾"	6½"	6¾"	6¾"	6½"
3"	7 7/16"	7⅛"	7 7/16"	7 7/16"	7"
4"	8⅝"	8¾"	8⅝"	8⅝"	8"
5"	9 11/16"	9¾"	9 11/16"	9 11/16"	8¾"
6"	11"	11¼"	11"	11"	9½"
7"	12 5/16"	12¾"	12 5/16"	12 5/16"	10¼"
8"	13½"	13⅞"	13½"	13½"	11"
9"	14 11/16"	15"	14 11/16"	14 11/16"	12"
10"	16"	16½"	16"	16"	13"
12"	18¾"	19⅝"	18¾"	18¾"	15"

These dimensions are for fittings when compression couplings are used.

If flanged fittings are ordered, we will furnish in accordance with table of Standard Flanged Fittings.

If a combination fitting is desired, for example, a Tee with one flange, one bell and a plain end—the dimensions will be in accordance with table of "Plain End Fittings" for compression couplings.

Standard Flanged Fittings

Size of Pipe		Size of Pipe	
1"	— 3½"	5"	— 7½"
1¼"	— 3¾"	6"	— 8"
1½"	— 4"	7"	— 8½"
2"	— 4½"	8"	— 9"
2½"	— 5"	9"	— 10"
3"	— 5½"	10"	— 11"
4"	— 6½"	12"	— 12"

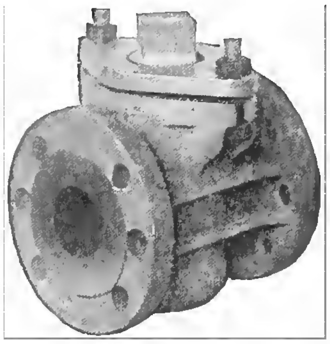
The above dimensions are from center of fitting to face of flange.

Dimensions of Duriron flanges are in accordance with U. S. 1912 Standard.

PLUG COCKS:

Duriron Plug Cocks are unquestionably the most efficient and economical device known to industry for the control of corrosive solutions.

We will make to customers' specifications any style or size of cock or valve that, in our opinion, can be successfully cast and finished in Duriron



PLUG COCK

Table of Dimensions of " New Model " Straightway Cocks

Sizes	⅜"	¾"	1"	1½"	2"	2½"	3"	4"
Diameter of flange	....	3½"	4 "	5 "	6 "	7 "	7½"	9¼"
Face to face of flanges	2⅜"	4 1/16"	4⅝"	5⅜"	6⅝"	7 3/16"	8 6/16"	12⅛"
Thickness of flanges	modified design	7/16"	⅝"	⅝"	¾"	¾"	⅞"	1 3/16"
Diameter of bolt circle		2½"	3 "	3⅞"	4¾"	5½"	6 "	7½"
No. and dia. bolt holes—flange type		*2 9/16"	*4½"	4 9/16"	4 11/16"	4 11/16"	4 11/16"	8⅞"
No. and dia. bolt holes—block type		†2 9/16"	2⅝"	2 11/16"	2 13/16"	2 13/16"	2 13/16"	—

Essential flange dimensions are U. S. Standard. The additional holes are for "block" installation (not introduced in 4-in. size).

* Slots instead of holes are used for ¾-in. and 1-in. sizes for flanged installation. † Slots in ¾-in. size are correctly placed for block installation.

Continued on Next Page

GLOBE VALVES:

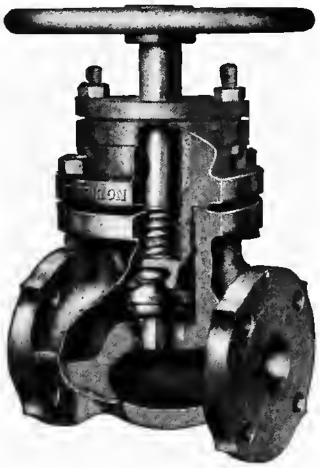
Duriron Globe Valves are perfect in workmanship and design—parts accessible and interchangeable without removing valve from line.

Lack of corrosion reduces sticking to a minimum. No leaks occur from porosity or dents in seat. Duriron is very close grained and hard.

Table of Dimensions Duriron Straightway Globe Valves

Size	Overall Length	Diameter of Bolt Circle	Bolts	
			No.	Size
1"	5¼"	3"	4	7/16"
2"	8¼"	4¾"	4	⅝"
3"	10½"	6"	4	⅝"
4"	14¼"	7½"	8	¾"
6"	18"	9½"	8	¾"

Globe Valves are also made in 90° angle type.


GLOBE VALVE

EJECTORS:

Standard Duriron Ejectors are designed to give a maximum of efficiency for this type of device. The jets are interchangeable and may be replaced. Special jets, to fit the standard body, may be made to order.

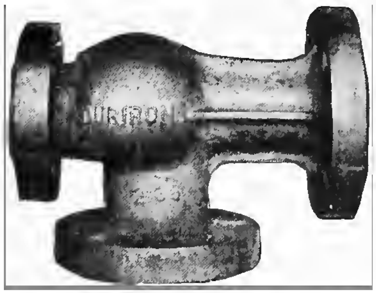
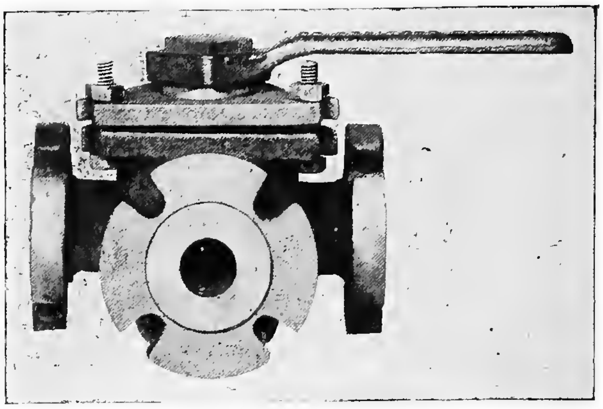

EJECTOR

Table of Dimensions of Ejectors

Size	Pipe Connections		Overall Length	Overall Height
	Steam	Suction & Delivery		
¾x1 x1	¾"	1"	6¾"	5"
1¼x1½x1½	1¼"	1½"	7 5/16"	5⅞"
1½x2 x2	1½"	2"	9¾"	7 9/32"
2 x2½x 2½	2"	2½"	12 3/16"	8"

We are in a position to furnish ejectors of other sizes than those shown in the table and will submit estimates and data upon application.

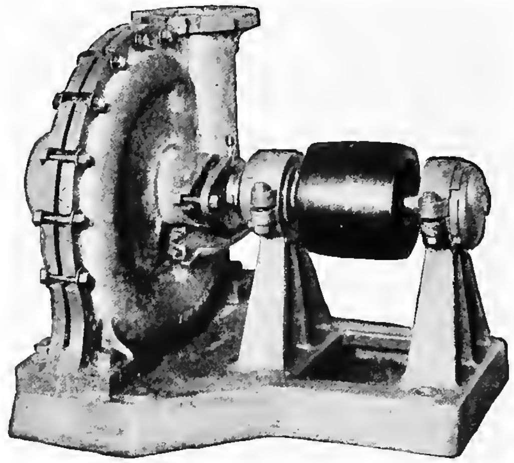

THREE-WAY COCK

Duriron Check Valves are exceptionally strong in design, and very efficient in operation. Furnished in straight or angle type. Dimensions same as for Globe Valves.

Duriron Safety Valves are of the beam type, and perfectly reliable. Dimensions same as for check valves.

CENTRIFUGAL PUMPS:

Since corrosion and erosion are the two great destructive agents in the operation of a pump, it follows logically that a pump of Duriron, which successfully resists these agents, has remarkable advantages in this particular field.


4" CENTRIFUGAL PUMP

All parts of this pump coming into contact with the solution are of Duriron. The pump is constructed accurately to gauge—the parts are therefore interchangeable. A Duriron pump requires a minimum of attention. Its life is practically unlimited. Practical elimination of packing trouble, provided proper packing is used—different acids and conditions demand different material for packing. Furnished either belt-driven or direct connected to motor.

Table of Capacity of Centrifugal Pumps

No.	Diam. Suction	Diam. Disch'g.	Capacity G.P.M.	Head Ft.	R.P.M.	H.P. Req'd.
1	2"	1½"	100	40	2100	5-7½
3	5"	4"	500	60	1750	10

Note: No. 1 also furnished with 1½" suction.

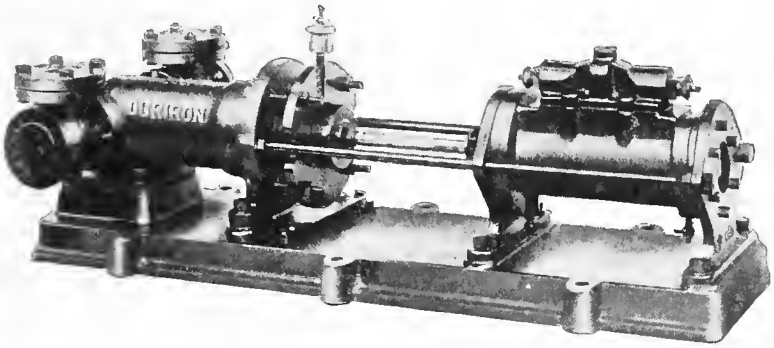
Continued on Next Page

RECIPROCATING PUMPS:

Our Reciprocating Pumps offer a means for handling small quantities of acid in an efficient and economical way.

Table of Capacity of Reciprocating Pumps

Diameter Inches		Cap. G.P.M.	Elev. Ft.	R.P.M.	H.P. Req'd.
Suction:	Disch'g.				
1½"	1½"	20	60	45	1.0



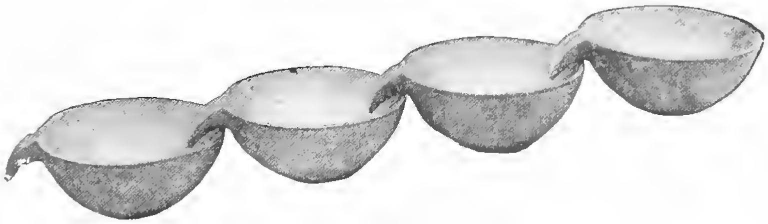
4" x 8" SINGLE ACTING PUMPS

In addition to the pumps listed above, we have in course of construction several 9" Centrifugal Pumps, and expect in the near future to add several other sizes.

A new Reciprocating Pump of the gear type is now being built, and embodies all the advantages coincident with such a design.

FANS:

Duriron Suction Fans are in ever-increasing demand for use with vacuum systems for handling acid fumes. They are built for belt drive or direct connection, and have shown good results with remarkably low power consumption.



CASCADE BASINS

SULPHURIC ACID APPARATUS:

All Castings for Cascade System and most of the Castings required for the pan and other systems.

Duriron Cascade Basins are used very effectively for the concentration of sulphuric acid. Water White Acid may be secured with them.

They are furnished in several sizes and types.

NITRIC ACID APPARATUS:

Practically all parts required (except Stills, for which Cast Iron is satisfactory) are furnished in Duriron. These include Goose Necks, Condensers of various types, Bleach Pots, Towers, Receivers, etc.

The Hough Condenser (Patented) is the most efficient in the market. We have the world's rights for manufacture and sale It will pay you to investigate.

SPECIAL CASTINGS: Range from a few ounces to five tons in weight and are suitable for manufacturing and handling Sulphuric, Nitric, Acetic Acids, Aniline and Coal Tar Dyes, and a wide variety of other processes.

The workmanship of all Duriron apparatus is of the highest quality. Like parts are interchangeable for standard apparatus, being machined to gauge.

GENERAL INFORMATION:

Design of Apparatus: Allow for shrinkage in castings and high coefficient of expansion. Curve surfaces and round corners if possible. Flanges are U. S. 1912 standard. Physical strength and casting peculiarities determine wall thickness since Duriron resists corrosion. Have ground surfaces accessible.

GUARANTEE:

All Duriron apparatus is guaranteed against defective castings, and to resist corrosion as well as sample submitted.

POLICY:

Your cooperation is necessary to secure the best results—the selection of proper packing for pumps, or some other apparently trivial detail, often stands between success or failure. Write us fully, not only when dissatisfied, but when results are not what you think they should be; we are always glad of the opportunity to place our experience at your disposal.

TERMS:

Thirty days, net. One per cent., ten days. All sales F. O. B., Dayton, Ohio.

In the foregoing pages we have touched on but a few of the many processes for which Duriron is being used, and have only called attention in a general way to the variety of Castings that may be produced. Inquiries are solicited.

DE LA VERGNE MACHINE CO.

Refrigerating and Ice-Making Machinery

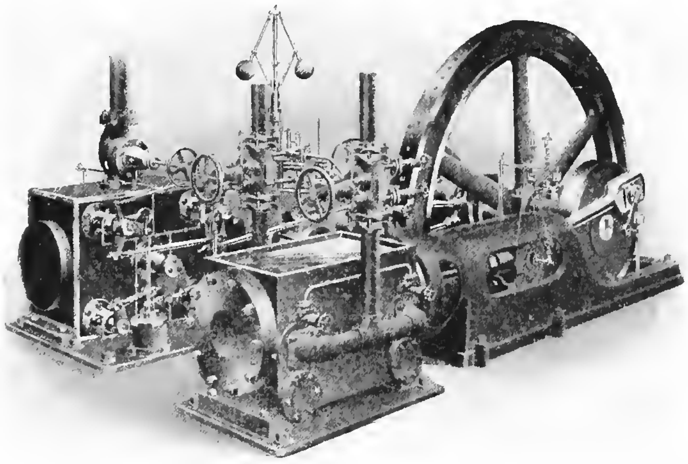
Main Office and Works

1195 East 138th St. - - NEW YORK CITY, N. Y.

PRODUCTS: Refrigerating and Ice-making Machinery for all Requirements of Refrigeration and Ice-Making; High Economy Crude Oil Engines.

MECHANICAL REFRIGERATION:

Mechanical refrigeration is a valuable asset for a chemical manufacturing plant. By its use the manufacturing process can be materially reduced in time and cost.



HORIZONTAL REFRIGERATING MACHINE WITH SIMPLE CORLISS STEAM ENGINE

Temperatures are under absolute control and the desired cooling and drying effect can be maintained at all times. The equipment required is quite simple and can be operated by an ordinary engineer in charge of other machinery.

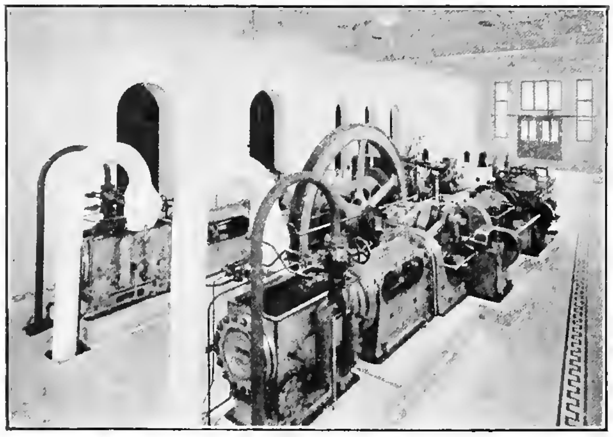
DE LA VERGNE CONSTRUCTION:

A special feature in connection with the design of the De La Vergne ammonia compressor is the location of the compressor valves. These are placed in pockets below the compressor cylinder in such a way that it is impossible for any part to find its way into the compressor and thereby cause serious damage. On account of this location, they may be quickly removed for inspection by simply taking off a few nuts. The compressor heads can be taken off without disturbing any connections.

Another feature of De La Vergne equipment is the special type of ammonia joint. All of our screwed ammonia fittings are constructed of a special grade of extra heavy malleable iron which are provided with a deep recess for solder. The pipe threads and fitting threads are first thoroughly tinned and then the joint is made up while hot. After this the deep recess in the fitting is completely filled with solder and carefully hand tinned so that all exposed pipe threads are covered. This construction gives the strongest possible ammonia joint which can be depended upon to remain tight indefinitely.

Some of the prominent chemical industries in which we have installed refrigerating equipment, are the following:

Soap Manufacturing
Rubber Manufacturing
Phenol Manufacturing
Silk Manufacturing
Paint Manufacturing
Pulp Manufacturing
Steel Tempering
Conditioning Air for Blast Furnaces
Glue Works
Crystallizing Plant
Manufacture of Explosives
Manufacture of Leather
Manufacture of Felin
Manufacture of Alkalis
Salt Separation
Manufacture of Aniline Dyes
Manufacture of Synthetic Dyes



TWIN COMPRESSOR REFRIGERATING MACHINE WITH CROSS COMPOUND STEAM ENGINE

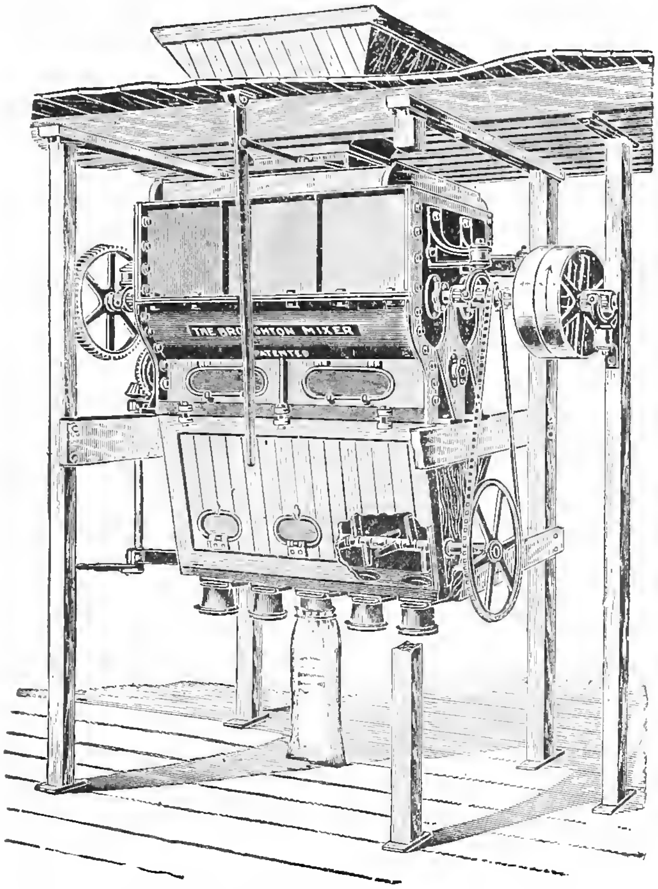
We are specialists in the field of refrigeration, having devoted over thirty-five years to this particular line. This long experience places us in a position to give advice on all problems of refrigeration, and our Engineering Department will gladly furnish full particulars for any specific requirements.

Send for our Bulletin No. 144.

W. D. DUNNING

Syracuse, N. Y.

PRODUCTS: Broughton Mixers; Shafting; Pulleys; Hangers; Gearing; Gray Iron Castings; Structural Iron.



THE BROUGHTON MIXER WITH AGITATOR ATTACHMENT AND RING SPOUT

The Broughton principle of mixing dry materials is the most thorough yet devised. It consists of a double set of paddles placed at opposite tangents on their shafts and revolving in opposite directions.

The admirable and quick results obtained by this Broughton way are impossible of achievement by a mixer having but one shaft and one set of paddles, or worm, no matter how it may be constructed. Such a mixer is little better than a conveyor.

Even the mixture of hair or fiber with dry powdered material, as a plaster, is perfectly accomplished on the Broughton.

The Broughton Mixer maintains a constant supply of thoroughly-incorporated materials. While one charge is being bagged, another is being mixed and a third is being put into the receiving hopper above, making it a continuous mixer.

CONSTRUCTION:

All working parts are made of iron and steel, resulting in a solid, durable machine, capable of year-in-and-year-out service with practically no attention. The doors that let down mixed material into receiving chamber have knife edges for shearing through fibre or other light obstructions; hence these doors always open freely and close tight. Duplicate parts can be furnished at any time.

CAPACITY NO. 2 STYLE A MIXER

No. 2 Mixer has a capacity of 40 to 75 tons of sand and plaster per day of ten hours—according to the facilities for handling the material and number of men to operate it. From 1,200 to 1,500 lbs. of plaster is considered a proper charge, yet many are mixing 1,800 lbs. with good results, and that at no time after the first starting of the machine is there less than from two to three times the above amount of material in the machine at one time.

This Mixer is furnished complete with hopper and receiving chamber as shown on cut, and also with two 24″ x 8″ fast and loose pulleys on the drive shaft which should run from 140 to 150 revolutions per minute.

CAPACITY NO. 1 STYLE A MIXER

No. 1 Style A Mixer has a capacity of 100 to 150 tons of sand and plaster per day of ten hours, according to facilities for handling the material and number of men to operate it. From 2,000 to 2,500 lbs. being the proper charge, yet at no time after the first starting of the Mixer is there less than from two to three times the above amount of material in the Mixer at one time. This Mixer is furnished complete with hopper and receiving chamber as shown on cut, also two 30″ x 12″ fast and loose pulleys on the drive shaft which should run from 140 to 150 revolutions per minute.

FLOOR SPACE

Style A No. 2	5′-10″ x 9′-6″. Height distance from top to top of floors should be 11′-0″ or more.
Style A No. 1	6′-0″ x 11′-9″. Height distance from top to top of floors should be 12′-0″ or more.

ESTIMATED H. P.

A No. 2	10-15
A No. 1	20-25

SHIPPING WEIGHT ABOUT

A No. 2	4,650 lbs
A No. 1	7,000 lbs

USES:

Broughton Mixers are equally well adapted for mixing Salt, Gunpowder, Sand, Lime, Paints, Fertilizers, Soap Powder, Baking Powder, Drugs, Chemicals, Foundry Core Sand, and many other substances.

EASTON CAR & CONSTRUCTION COMPANY

INDUSTRIAL RAILWAYS CARS AND ACCESSORIES

General Sales Office:
30 Church Street, New York City

Main Office and Works:
EASTON, PA.

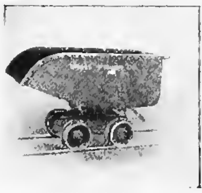


Fig. 270. Standard rotary scoop shaped dump car. This car can be equipped with end gate. Large stock.

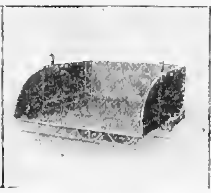


Fig. 73. Charging or boiler room cars. Large stock on hand.

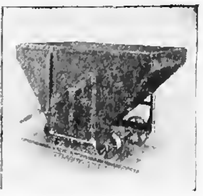
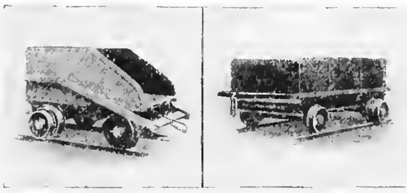


Fig. 280. Special charging cars built according to any design, and to meet any requirements.


Figs. 268 and 269. All-steel skips of different types. We build skips for any purpose and to meet any conditions.

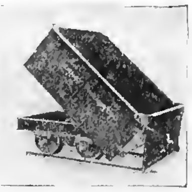


Fig. 277 All-steel mine cars to dump end, side or rotary, any capacity and gauge.

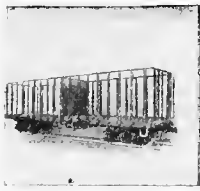


Fig. 180. Double truck cane cars—built up to 30 tons capacity and having any style of superstructure.

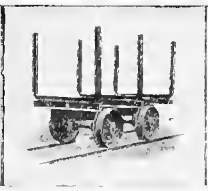


Fig. 419. Cars of all kinds for rolling mills and steel plants. Cars for Charging Boxes, Ingots, Bar Iron, Pipe, Etc.

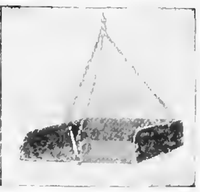


Fig. 45. Grout Box. We make boxes and buckets of any design, dimensions and capacity.

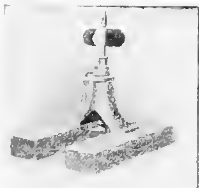


Fig. 285. Switches, points, frogs, switch stands and ground throws of every type.

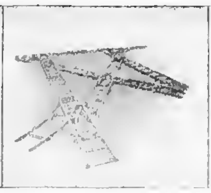


Fig. 251. Complete track layouts to order; any gauge and weight of rail.

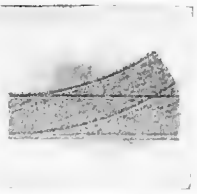


Fig. 185. Cast iron plate switches and cast iron plate track for boiler rooms, power plants, etc.

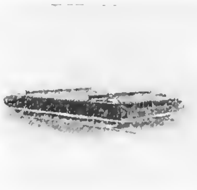


Fig. 284. Transfer cars of any design, for any capacity and gauge.

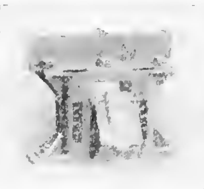


Fig. 262 Axle boxes and roller bearings, for inside or outside journals.

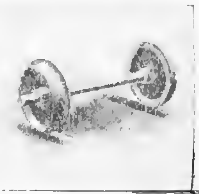


Fig. 86. Wheels and axles of any design.

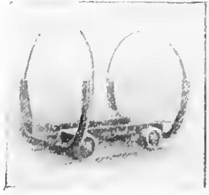


Fig. 283. Creosoting cars. We build cars of this type for any capacity and gauge.

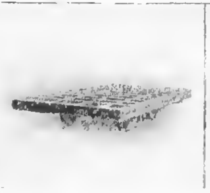


Fig. 266. Core oven car. Cars of this type and other foundry types built for any capacity and gauge.

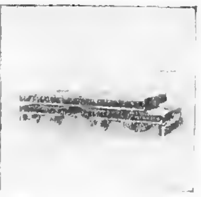


Fig. 274. Double truck platform cars. Flat cars, all steel, wooden or combination; any size, capacity and gauge.

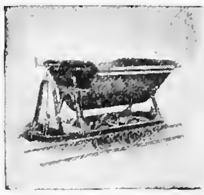


Fig. 276. Standard cradle dump cars, built to dump side, endwise or rotary, Large stock.

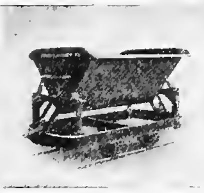


Fig. 255. Standard rocker dump cars, built for any capacity and gauge; with or without brakes. Always in stock for regular capacities & gauges.

Fig. 186. Large dump cars built for any capacity and gauge. and to meet any requirements.

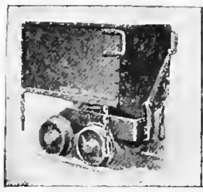


Fig. 159. All-steel mine cars for end, side or rotary dump, any capacity and gauge.

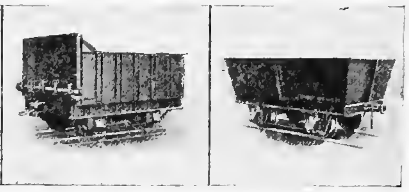


Fig. 223 and 161. Quarry cars of any design, constructed of steel, wood or combination, and for any capacity and gauge.

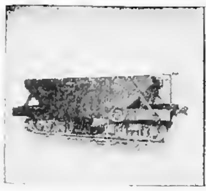
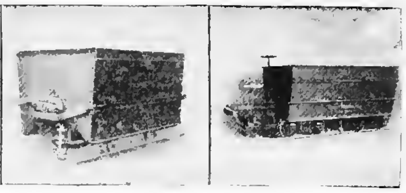


Fig. 226. All-steel, double truck, hopper cars built to order for any capacity and gauge.


Figs. 249 and 189. All-steel, gable bottom cars, 4 or 8 wheels, equipped with automatic door opening device, cable grips, etc. Cars built to meet any condition.

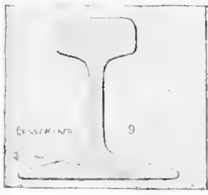


Fig. 9. Rails of any weight. Large stock on hand.

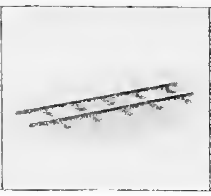


Fig. 77. Industrial track on steel ties. For any gauge and weight of rail.

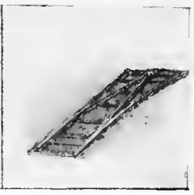


Fig. 80. Switches with or without steel ties. All gauges and weight of rail.

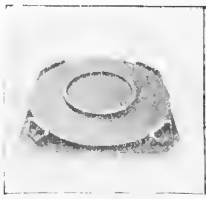


Fig. 292. Wrought iron turntables, light construction. Large stock.

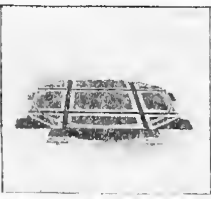


Fig. 94. Standard cast iron ball-bearing turntable with automatic locking device. Large stock on hand.

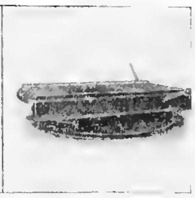


Fig. 254. Structural steel turntables, heavy construction: for any gauge and to meet any requirements.

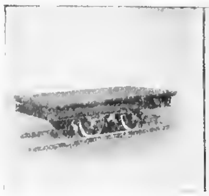


Fig. 286. Platform cars with wooden or steel flooring, steel frame; with or without stake pockets. Large stock.

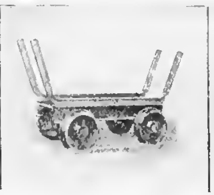


Fig. 273. Billet cars. We build special all-steel cars for steel mills and iron foundries; any capacity and gauge.

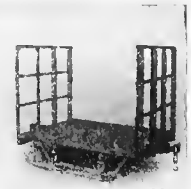


Fig. 147. All-steel car with end walls, used especially for carrying sugar cane.

ELECTRO BLEACHING GAS COMPANY

18 East 41st St.
NEW YORK

Factory
Niagara Falls, N. Y.

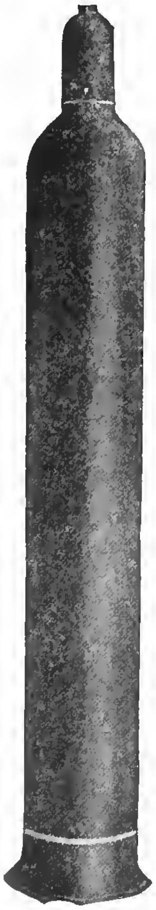
Address all inquiries
to New York office

PRODUCT: Liquid Chlorine as manufactured by the Electro Bleaching Gas Company, is a highly purified and especially prepared chlorine for use in the textile and chemical industries. By refrigeration and compression it is liquefied and placed in containers of a size and weight suitable for convenient handling. The chemical analysis of Liquid Chlorine shows it to be practically pure chlorine gas.

ANALYSIS:

Chlorine	99.80% to	99.99%
Carbon Dioxide	0.01 % to	0.20%
Air and Oxygen	0.00 % to	0.10%

Chlorine is shipped in cylindrical steel containers holding approximately 100 pounds. Each of these cylinders is carefully tested to comply with the I. C. C. rules. The pressure of chlorine at ordinary room temperature is approximately 100 pounds per square inch. The cylinder is provided with a specially constructed valve which permits of the easy regulation of chlorine when in use. The valve is also constructed so that a sudden or too great a flow of gas is not permitted and is thus practically fool-proof against the ignorance or stupidity of careless workmen. Over this valve is a steel screw cap which protects it from injury during shipment.



CYLINDER WITH CAP ON

CYLINDER WITH CAP OFF
Height 52 inches to neck

Chlorine is used in the manufacture of numerous chemical products and is one of the important factors of the chemical industry to-day. As a bleaching agent it is very superior to anything else in use and does away completely with the very disagreeable features accompanying the preparation of solutions as formerly used. It also has the advantage of being 100% available chlorine, and the finish and texture of materials bleached with chlorine surpass the effect produced by any other bleaching agent.

Liquid Chlorine can be used for bleaching any vegetable matter and, for such materials, has no equal.

EIMER AND AMEND

Established 1851

NEW YORK CITY
205-211 Third Avenue

PITTSBURGH
2006 Jenkins Arcade

PRODUCTS: Laboratory Apparatus, Industrial Testing Instruments, Chemicals—technical and chemically pure—Minerals and Drugs.

Special Service: Foremost among our activities along special lines is the development of apparatus and cooperation with designers in perfecting new apparatus and their marketing, for which our long successful experience aptly adapts us.

GLASS BLOWING:

We operate on the premises a large and well-equipped scientific Glass-Blowing Shop besides the Stuyvesant Glass Co., Gramercy and Annex shops. These shops are equipped to make practically any article that can be blown in the lamp, but specialize particularly on highest grade Chemical and Beckman Thermometers, Hydrometers, Volumetric Glassware, Stopcocks, and Ground-Glass Apparatus, etc.

PYREX LABORATORY GLASSWARE

The best ware made, supreme chemical stability, heat resistance and mechanical qualities.

CHAINOMATIC ANALYTICAL BALANCE

Eliminates customary rider apparatus and small weights to 50 mgr.

PUBLICATIONS:

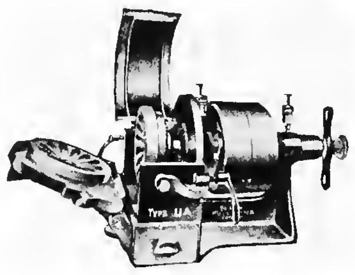
Chemical, Metallurgical and Assay Laboratory Supplies Catalog C.—Four hundred and forty-seven pages profusely illustrated, well-arranged index. Comprises a comprehensive and careful selection of Glass, Porcelain, Metal, and Wooden Ware, Balances and Weights, Filter Paper, Volumetric Glassware, Thermometers, Hydrometers, Gas Analysis Apparatus, Optical Instruments, Testing Instruments, etc., etc., covering practically everything that is required for general industrial and educational laboratory analysis and investigation. Individual pamphlets descriptive of many articles listed are published.

Bacteriological and Biological Laboratory Apparatus, Catalog B.—Presents the approved and generally used types of Microscopes and Accessories, Incubators, Sterilizers, Apparatus for Blood, Urine and Milk Testing, and general equipment for Medical and Public Health Laboratory work.

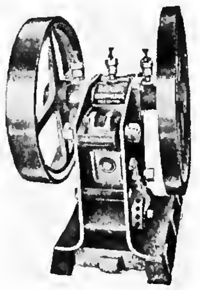
Chemicals.—A valuable index covering Organic and Inorganic Chemicals and Acids, Aniline Dyes, Alkaloids, Metals, Oils, Standard Reagents, Microscopic and Bacteriological Stains, etc., of which we carry the most varied stock in America. The products sold as E. & A., T. P. Reagents represent a careful selection of American and European products; consequently, the line represents the best the market affords

We have commenced the manufacture of certain Sugars, Alcohols, and other Organic Chemicals that heretofore were imported exclusively. A special catalog will shortly be issued—Inquiries are solicited.

Fuel Testing Apparatus.—A treatise on the subject, embracing the advantages of Fuel Testing, standard methods for determining B. T. U.'s, Ash, Moisture, etc.; also correct methods of sampling, standardizing the Calorimeter, etc. The standard Calorimeters are illustrated; complete working description of the Emerson regular and Adiabatic outfits is given. A section is devoted to a selection of general Fuel Testing Apparatus.



BRAUN CHIPMUNK CRUSHER



BRAUN DISC PULVERIZER

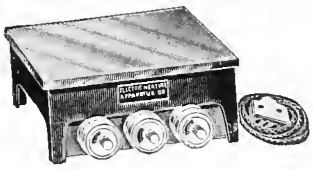
Crushers and Grinders.—Describes the widely used Braun Appliances, for crushing and grinding laboratory samples of coal, cement, ores, chemicals, etc.

PUBLICATIONS—Continued

Modern Electrically Heated Laboratory Appliances: Illustrates and describes the standard approved Appliances that are widely used, such as Hot Plates, Furnaces, Air and Vacuum Drying Ovens, Water Baths, Extraction Apparatus, etc., etc. The utility convenience and safety of electricity as a heating medium is now generally recognized.

MULTIPLE UNIT ELECTRIC FURNACES

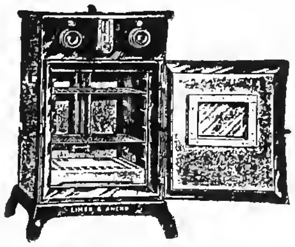
Most efficient, clean, easily regulated muffle, tube, crucible and organic types.



REPLACEABLE UNIT ELECTRIC HOT PLATE

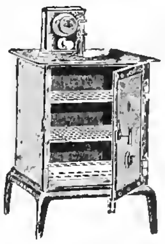
This is virtually a constant temperature hot plate, six heats can be maintained

Freas Electric Constant Temperature Ovens: Describes in detail the various types which are now extensively used throughout the world for manufacturing purposes and laboratory work where *long period drying at accurate constant temperature is required.* Types for temperatures up to 180° C. and 260° C. respectively, are described; also type with forced air circulation, which facilitates the drying operation especially with articles containing considerable moisture; also type with revolving shelf, for determinations requiring absolute temperature uniformity on one level. Two forms of the Freas Electric Vacuum Oven, which is the only reliable Oven available for drying in vacuum under accurate constant temperature, are described; also the Freas Conditioning Oven, which is meeting with much favor in the industries, etc., for the determination of moisture in Textile Materials, Paper, etc.



FREAS ELECTRIC OVENS

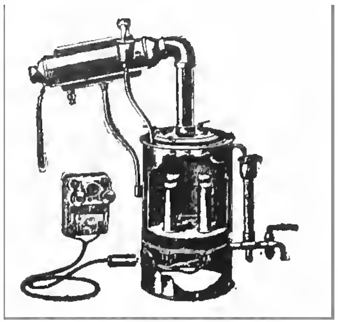
The standard throughout the world for continuous, accurate constant temperatures up to 180° C. and 260° C.



VARSITY ELECTRIC OVEN

The best moderate price oven for accurate constant temperature.

Water Distilling Apparatus: Describes in detail the Barnstead Still and other apparatus for producing pure distilled water for manufacturing operations and for analytical laboratory purposes. In sizes capacity ½ to 100 gallons per hour, for heating by gas, steam, and electricity.



BARNSTEAD WATER STILLS

Highest purity water produced at lowest cost—easy to clean.

WYSOR METALLOGRAPHIC MACHINE

For grinding polishing metallic specimens for microscopic examinations.

Apparatus for Metallography: Presents a selection of Metallurgical Microscopes and Photo-Micrographic Apparatus for examining microstructures in connection with the analysis and heat treatment of Steels, etc. A complete description is given of the Wysor Polishing and Grinding Machine and method of preparing metal specimens for Photo-Micrographic work.

Filter Papers for Manufacturing and Analytical Purposes: An index of our large stock of E. & A. American, Whatman English, Schleicher & Schull German, Muncktell Swedish and Prat Dumas French Filter Papers.

Oil Testing Apparatus and Viscosimeters: Listing the standard apparatus for flash point determinations, Engler', Saybolt, Doolittle, Redwood's Viscosimeters, etc.

Gas Testing Apparatus: A comprehensive catalog of the most up-to-date apparatus for general gas analysis, flue and furnace gas analysis, sampling, etc.

In addition to the above publications covering most generally used appliances, we issue pamphlets descriptive of Gas Calorimetry, High Vacuum Pumps, Apparatus for Milk and Water Testing, etc., etc.

ELECTRIC HEATING APPARATUS CO.

Regularly carried in stock by
Braun-Knecht-Heimann Co.
San Francisco
The Braun Corporation
Los Angeles
Eimer and Amend
New York
Lymans, Ltd.
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Multiple Unit Furnaces and Heating Appliances

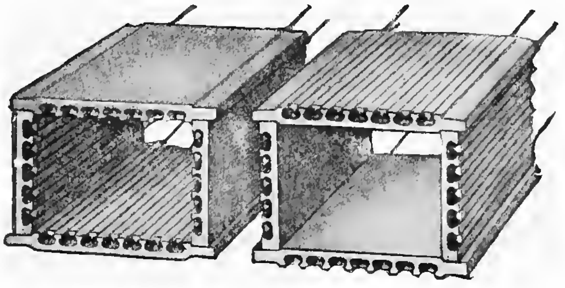
Branch Office:
25 Church Street
NEW YORK

General Office and Factory:
121-123 Sussex Ave.
NEWARK, N. J.

Regularly carried in stock by
Arthur H. Thomas Co.
Philadelphia
Eimer & Amend
Pittsburg
E. H. Sargent & Co.
Chicago

PRODUCTS:

Multiple Unit Furnaces and Heating Appliances; Multiple Unit Electric Furnaces for Organic Combustions; Electric Hot Plates; Flask Heaters, Etc.



Muffle Units are Reversible

MULTIPLE UNIT ELECTRIC FURNACES, MUFFLE, CRUCIBLE, TUBE TYPES:

Multiple Replaceable Unit System:

By means of the Multiple Unit feature of this system, all parts containing the Heat Producing Resistor Coils are independently inserted into the furnace chamber to form a complete Muffle, Crucible or Tube form. Being wholly contained in the heating chamber all heat generated is effective, making the efficiency higher than in any other electric furnace.

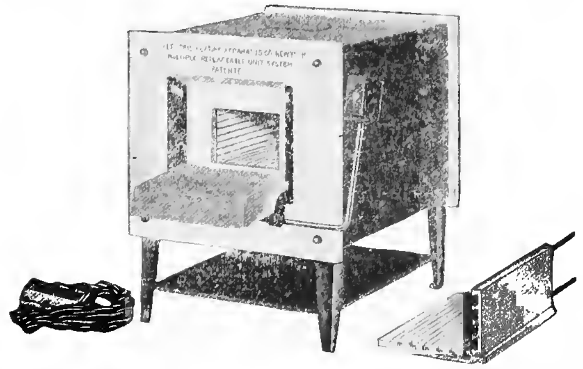
The Multiple Unit System is patented. Enables the operator to remove the one unit which may have burnt out, thus leaving the other unit or units in the furnace for further service. Any unit, in case of a burnout in the Multiple Unit System, can be easily replaced in five minutes' time by the operator.

MUFFLE FURNACES

Inside Sizes in Inches				Prices		Extra Units		Rewiring Units		Rear Doors Extra
Type	Wide	High	Deep	Furnace Only	With Rheostat	Top (or Bottom)	Side	Top (or Bottom)	Side	
50	3¼	2½	7	$40.00	$48.00	$3.50	$2.75	$2.00	$1.75	$5.00
52	4¼	3	10	50.00	59.00	4.75	4.25	2.75	2.50	5.50
54	5¼	3¾	12	65.00	77.00	6.25	5.00	3.50	3.00	6 00
56	7½	5¼	14	100.00	120.00	8.00	7.00	5 50	5 00	7.00
*60	3¼	2½	7	62.50	Incased	3.50	2 75	2.00	1.75	5.00
*62	4¼	3	10	72.50	"	4.75	4.25	2.75	2.50	5.50
*64	5¼	3¾	12	92.50	"	6.25	5 00	3 50	3.00	6.00
*66	7½	5¼	14	140.00	"	8.00	7.00	5.50	5 00	7.00

NOTE: **Always specify voltage** when order includes rheostat.

* Also made with rheostat encased in base. Types 60 to 66.



Standard Muffle Furnace, Types 50, 52, 54 and 56, with one each "Spare" Top (or bottom) and Side Units.

COMBUSTION TUBE FURNACES (not illustrated):

Furnaces of this type, while designed primarily for combustion work, have been used extensively for enameling or hardening tubes, rods, helical springs, etc., and for Pyrometer Calibration.

Standard type, non-opening form is Type 77. Type 70 is hinged, so that the upper half may be raised for observation, similar to the Organic design illustrated below.

Inside Sizes—Inches					Spare Units				Net		Boxed	
Type	Diameter	Length	Furnace Only	With Rheostat	Alundum Tube Extra	Number Per Set	Each Extra	Rewiring Units	Furnace Only	Rheostat	Furnace Only	With Rheostat
									Lbs.	Lbs.	Lbs.	Lbs.
77	1¼″	12″	$25.00	$32.00	$2.00	2	$4.50	$2.50	17	4	25	29
70	1¼″	12″	37.50	45.50	2.00	2	5.75	3.25	25	7	33	40

* Advisable only for Pyrometer Calibrating Work. Tubes are 1″ inside diameter.

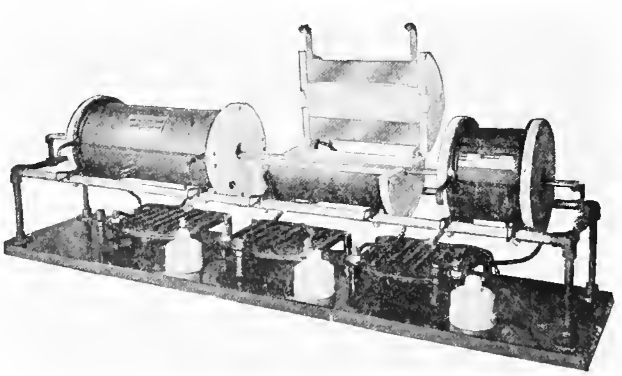
NOTE: **Always specify voltage** when order includes rheostat.

CRUCIBLE FURNACES (Not Illustrated):

This form of furnace is used extensively for melting small quantities of base metals; for **pyrometer calibration when couples are immersed** in molten salts or metals; and for Decalescent Work in Steel.

MULTIPLE UNIT ELECTRIC ORGANIC COMBUSTION FURNACES:

This apparatus has been designed to replace oil or gas fired furnaces especially for organic combustions.



ADVANTAGES:

Each section of the electric furnace, during any one combustion, is used independently in place of groups of Bunsen Burners. Each section is easily moved along the rails to provide for combustion at different points, instead of the use of additional burners of the gas type. The individual switches and rheostats mounted on the base afford a means of operating each furnace independently.

For observation purposes the upper half may be raised without shutting off the heat, exposing the glass combustion tube. No fumes are present. Effective heat insulation. Quickly responsive to all conditions of quick or slow heating or cooling.

PRICES:

Type 123, complete, as shown above, $110 net. Weight 70 lbs. net. Boxed, 135 lbs.

Nickel Trough, for Combustion Tube Support, each 33½″ long, $3.50 net.

Voltage must be specified with order.

Continued on Next Page

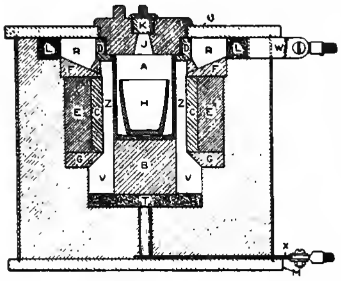
"HIGH-TEMP" ELECTRIC FURNACE:

For temperatures up to 1800° C.

Operates on either Alternating or Direct Current lines up to 125 Volts.

Several meritorious features are embodied in the new "High-Temp" Furnace, the lack of which in high temperature furnaces heretofore offered has made them undesirable in many respects, and not within the reach of all workers, due to comparatively high selling prices made necessary by their construction and the cost of auxiliary apparatus generally necessary for operation on Alternating current.

The simplicity of operation, low current consumption, inexpensive replacement parts, and the moderate price of the complete outfit establish the claim that the "High-Temp" Furnace is the most desirable high temperature outfit for research and general laboratory purposes.



HIGH TEMPERATURE FURNACE

Under normal heats the furnace reaches 1600° C. in about one hour, requiring a maximum load of approximately 40 Amperes and consuming about 2.75 K.W. hours in reaching this temperature. The furnace can be used equally as well for lower temperatures to about 500° C.

DIMENSIONS:

Size of heated chamber is 2¼ inches diameter, 3¾ inches deep. Outside dimensions of furnace 14½ inches diameter, 19 inches high over all. Switchboard Panel is 1 inch black oil-finished slate, 17 inches wide, 26 inches high. Rheostat, which is mounted on the back, forms the mounting for the panel—total depth from wall when mounted, 9 inches.

RESISTOR ELEMENT:

A special mixture of granular material is used as the resistor element. The sectional cut shows the method employed in securing a heating zone "Z" which is formed by two concentric cylinders—"A" and "B" inside and "C" outside. The chambers "R" and "V" being of large cross sectional area have low resistance—hence heat is developed only in the zone "Z." Parts "L" and "T" are graphite electrodes forming contact with the granular resistance material and through such graphite to copper busbars "W" and "X." When used under normal conditions it will not be found necessary to ever replace these graphite electrodes. Five pounds of resistor material is furnished with the furnace—about three pounds is required for the first charge, which is gradually replaced as it is used up.

REPLACEMENTS:

All refractory parts "A," "B," "C," "D," "J," and "K" (which may be destroyed through excessive heats or through numerous successive heats under normal conditions) are readily replaceable by the operator.

PRICES:

FURNACE—"High-Temp" Electric, type No. 88, for Direct Current, complete......net	$175.00
Ditto—for Alternating Current, complete..net	185.00
Ditto, on tilting base for operating in any position from vertical to 30° from horizontal Extra................................	10.00
Granular "High-Temp" Resistor Material per 5 pounds........................net	1.50

MULTIPLE REPLACEABLE-UNIT HOT PLATES:

750° F. (400° C.) Maximum. 160° F. (71° C.) Minimum.

The wide application of electrically heated Hot Plates has disclosed the necessity of temperatures higher than heretofore attained, but with less expenditure of current and quick replacement of heating units for emergency repairs.

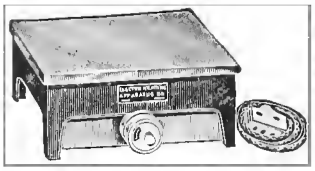
MULTIPLE-UNIT HOT PLATES:

Give temperatures twenty-five per cent. higher than other makes with equivalent current; give the same temperatures with thirty per cent. less current. The units are readily renewable by the operator.

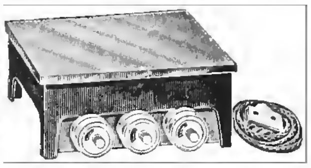
CONSTRUCTION:

Cast Iron Bases and Tops. Bases finished in "Optical Black." Top Plate, polished surface. Units, two or four in each plate are moulded "Electrobestos," grooved to receive the heating elements, which are imbedded in a refractory cement. Top plate rests on the units, free from contact with the base, which obviates the loss of heat by conduction. The Units rest on bricks of low thermal conductivity, having a conductivity of about one tenth that of ordinary fire bricks. This forces to the top of the plate a maximum amount of heat generated and affords a comparatively cool atmosphere to the under side of the apparatus. The increased efficiency is a net saving in current cost; gives higher temperatures and quicker maximum heats.

When the Three-Heat Hot Plate is used on 110 volts, the connector plug at the rear may be shifted to the connector pins designed for 220 volts. This **"Shifted Voltage"** gives an additional three heats, making the Hot Plate readily desirable for alcohol extractions, ether evaporations and such similar low temperature work. Similarly, the One-Heat type gives two heats when used on "Shifted Voltage."



Type 10—Cut No. 1
12¼″ x 12¼″ — 5⅞″ high.



Type 12—Cut No. 2
12¼″ x 12¼″—5⅞″ high.

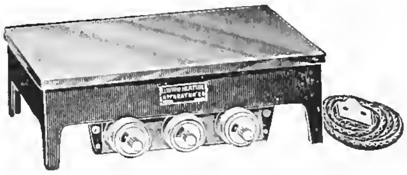
Type 10. (Cut No. 1.) Single Heat on 110 or 220 V: Two Heats on 110 volts, with "Shifted Voltage." One switch, mounted as shown. Complete $20.00

Extra Units, two per set, $3.50 per unit. Rewiring Units, $2.00 each.

Type 12. (Cut No. 2.) Three Heats on 110 or 220 volts: Six Heats on 110 volts with "Shifted Voltage."

Three switches mounted as shown. Complete.. .... $22.50

Extra Units, two per set, $3.50 per unit. Rewiring Units, $3.00 each.



Type 22—Cut No. 4
12¼″ x 18″—5⅞″ high.

Type 22. (Cut No. 4.) Three Heats on 110 or 220 volts: Six Heats on 110 volts with "Shifted Voltage." Three switches mounted on 18″ edge.

Complete...... $27.50

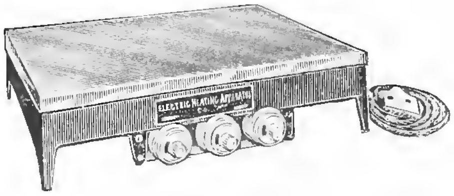
Type 20. (Cut No. 4.) Same as Type 22, except switches are mounted on 12¼″ edge.

Complete...... $27.50

Type No. 24. Single Heat on 110 or 220 volts: Two Heats on 110 volts with "Shifted Voltage." Has no switch nor switchboard as are shown in cut No. 4.

Complete $24.50

Extra Units, two per set, $5.00 per unit. Rewiring Units, $4.00 each.



Type 32—Cut No. 5
18″ x 24″—5⅞″ high.

Type 32. (Cut No. 5.) Three Heats on 110 or 220 volts: Six Heats with "Shifted Voltage." Three switches mounted on 24″ edge as shown.

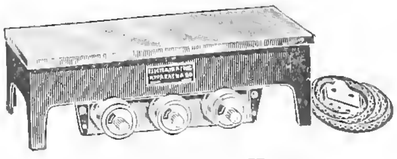
Complete... $42.50

Type 30. (Cut No. 5.) Same as Type 32 except switches are mounted on 18″ edge.

Complete .. $42.50

Type 32. Single Heat on 110 or 220 volts. Two Heats with "Shifted Voltage." Has no switch nor switchboard as are shown in cut No. 5. Complete $39.00

Extra Units, four per set, $5.00 per unit. Rewiring Units, $4 00 each.



Type 40—Cut No. 3
6½″ x 18″—5⅞″ high.

Type 40. (Cut No. 3.) Three Heats on 110 or 220 volts: Six Heats on 110 volts, with "Shifted Voltage." Three switches mounted as shown.

Complete $20.00

Type 42. Single Heat on 110 or 220 volts: Two Heats on 110 volts, with "Shifted Voltage." One switch instead of three as shown in cut No. 3.

Complete $17.50

Extra Units, two per set, $3.00 per unit. Rewiring Units, $2.50 each.

ELECTRO-CHEMICAL SUPPLY AND ENGINEERING COMPANY

Stephen Girard Building
21 South Twelfth Street, Philadelphia
Cable address: ECSEC Philadelphia

PRODUCTS: Sulphuric Acid Plants, Nitric Acid Plants, Muriatic Acid Plants, Phosphoric Acid Plants, " Duro " Acid-Proof Brick and Cement.

We are prepared to design, erect and operate complete plants for the manufacture of sulphuric, nitric, muriatic, or phosphoric acid, also the recovery and concentration of spent acids. Further, we are prepared to furnish complete plans and estimates for electrolytic chlorine and caustic plants, also electrolytic copper and zinc plants.

We incorporate in all our designs the most advanced methods and especially recommend our "Duro" acid-proof brick and cement in such construction, which has proven under most vigorous tests to be very substantial and durable.

We also are prepared to furnish expert superintendence and can supply men thoroughly trained in the operation of such plants if desired.

We act as Consulting Engineers in general plant operation, where so desired, advising as to the most economical design and general plant efficiency.

Our broad experience in design, construction and operation of chemical plants and chemical apparatus will be valuable in the reconstruction of plants now in operation, as well as for contemplated projects.

THE ELYRIA ENAMELED PRODUCTS COMPANY

ELYRIA, OHIO, U. S. A.

NEW YORK
50 Church Street

PITTSBURGH
1237 Oliver Building

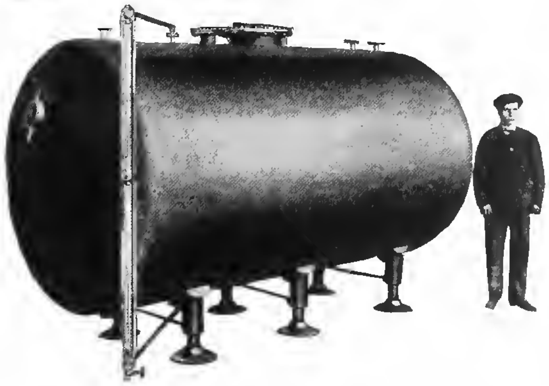
SAN FRANCISCO
16 California Street

CHICAGO
1033 W. Lake Street

PRODUCTS: Seamless One Piece Acid and Alkali Resistant Glass Enameled Apparatus; Tanks open and closed, plain and jacketed; Kettles steam and water jacketed; Agitating and Mixing Apparatus; Vacuum Pans; Stills; Pipe and Fittings; Welded Steel Tanks, not enameled; Special Equipment for Chemical, Canning, Dairy, Packing and all General Manufacturing Plants.

STILL WITH AGITATOR AND CONDENSER

This shows general type of construction for Still or Vacuum Pan. Cover is welded and provided with manhole on larger sizes.



STANDARD TYPE CIRCULAR CLOSED TANK

This style tank can be made up to 4500 gallons capacity.

Plain Welded Steel Tanks Not Enameled. These are especially built for high pressure and vacuum service. We can guarantee a practically perfect joint and absolutely non-porous.

Practically all our apparatus is specially built, hence only a small portion can be shown here. Send for detailed information and catalog.

ACID AND ALKALI RESISTANT:

Our glass enamel has all the chemical resisting qualities of chemical glass, but mechanically is stronger and more elastic.

NO SCALING OR CRAZING:

Our glass enamel fused into the steel cannot crack, craze or scale due to expansion and contraction caused by alternate heating and cooling.

SEAMLESS ONE-PIECE:

This produces practically a large glass bottle but capable of standing the necessary pressure or vacuum.

STANDARD TYPE OPEN JACKETED KETTLES

Sizes from 25 to 2000 gallons.

LIGHT WEIGHT PRESSED STEEL CONTAINERS

Sizes up to 50 gallons; other special shapes furnished.

THE J. D. FATE COMPANY

MANUFACTURERS OF

CLAY WORKING MACHINERY AND GASOLINE LOCOMOTIVES

PLYMOUTH, OHIO, U. S. A.

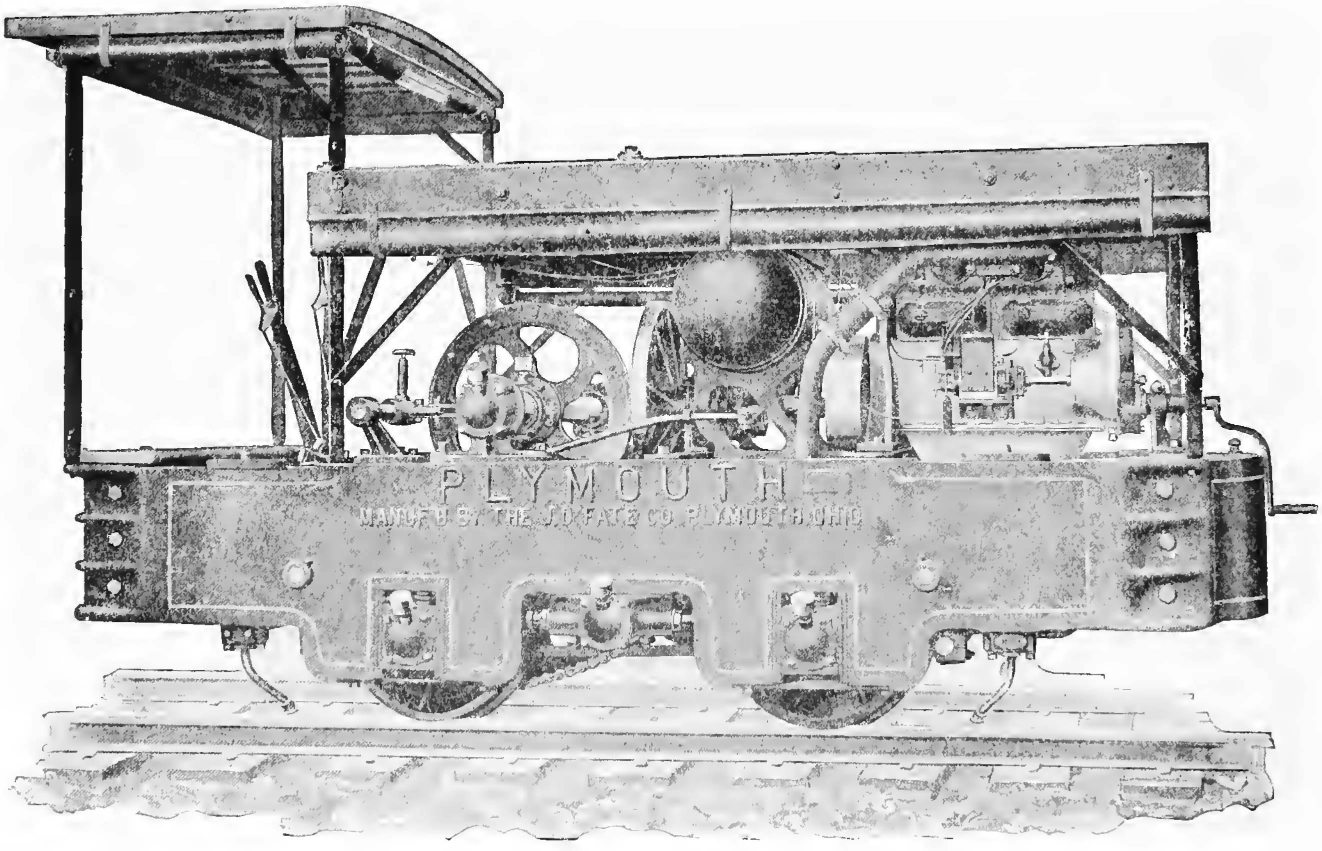
PRODUCTS: Plymouth Gasoline Locomotives for Hauling Materials of all kinds around Chemical and Metallurgical and other Industrial Plants.

The Union Powder Corporation, Parlin, N. J., use these locomotives because they are *safe* for hauling explosives. The Nixon Nitration Works use them for hauling explosives about their plant yard at Perth Amboy for the same reason. Besides being safe they are economical, reliable and easy to operate.

A FEW INDUSTRIAL PLANTS WHO HAVE BOUGHT ONE OR MORE PLYMOUTH GASOLINE LOCOMOTIVES

Among the list of Plymouth owners are some of the largest and most important industrial plants in the world, as well as some of the smaller manufacturers. In the list below the names are selected with the idea of giving the greatest variety of classifications and the widest geographical distribution, as a matter of convenience to those who may desire to visit someone in a kindred business and yet near enough to make the trip economical. Here are some of the industrial plant owners in the United States, Canada, England and elsewhere.

Purchaser	Office Address	Plant Location	No. in Use
Ball Engine Co	Erie, Pa	Erie, Pa	1
Nixon Nitration Works	New Brunswick, N. J	Perth Amboy, N. J	2
Union Powder Corporation	Parlin, N. J	Parlin, N. J	1
Pittsburgh Iron & Steel Foundry Co	Midland, Pa	Midland, Pa	2
Honolulu Iron Works Co	Honolulu, Hawaii	Honolulu, Hawaii	1
Halesowen Steel Co	Halesowen, Eng	Halesowen, Eng	2
Bethlehem Steel Co	New Castle, Del	New Castle, Del	1
Lake View Spool Mills Co	Lake View, Me	Lake View, Me	1
Willys-Overland Co	Toledo, O	Wagon Works, O	2
San Pedro Growers Co	Columbus, O	Isle of Pines, Cuba	1
Kilbourne & Jacobs Mfg. Co	Columbus, O	Columbus, O	1
American Can Co	New York City	Undercliff, N. J	1
Loretto Iron Co	Chicago	Loretto, Mich	1
O'Brien Munitions, Ltd	Renfrew, Ont., Can	Renfrew, Ont., Can	2
Dequesne Steel Foundry Co	Pittsburgh, Pa	Pittsburgh, Pa	2
Vedovelli-Priestly Co	Ivry S/Seine, France	Ivry S/Seine, France	2
The Consolidated Expanded Metal Co	Braddock, Pa	Rankin, Pa	1
John A. Roebling Sons Co	Trenton, N. J	Trenton, N. J	1
Dodge Brothers	Detroit, Mich	Detroit, Mich	1
Graselli Chemical Co	Cleveland, Ohio	Cleveland and Chicago	2



MAGNETO VIEW OF PLYMOUTH THREE-TON (MODEL AL) WITH CAB, AND CURTAINS ROLLED UP TO EXPOSE MACHINERY

FOOTE MINERAL COMPANY, Inc.

111 North 19th St., PHILADELPHIA, PA.

SPECIALISTS IN UNUSUAL ORES   MANUFACTURERS OF MINERAL PRODUCTS

Established over forty years.   **Cable Address "Foote Philadelphia." All codes used.**   **Reg. U. S. Pat. Off.**

PRICES CHANGE CONSTANTLY

" FOMINCO " GUARANTEED ORES AND PRODUCTS:

ANTIMONY

Antimony, Regulus, 99%. 15¢ per lb.

Oxide, White, 96% acid soluble. 27¢ per lb.

Needle Antimony (Sulfide) 70%. 17¢ per lb.

BARIUM

Carbonate, precipitated, 96%. $100 per net ton.

Carbonate, crude (Witherite) 90% $BaCO_3$. $70 per net ton.

Dioxide, 70%. 36¢ per lb.

Nitrate, 98%. 14¢ per lb.

Sulfate, crude (Barytes), various grades. Off color, $40; White, $45; Commercial Lump, $12 per net ton.

Sulfate, precip. (Blanc Fixe), 67%. $70 per net ton.

BERYLLIUM

Silicate (Beryl), 12% BeO. $60 per net ton.

Nitrate. $12 per lb.

CALCIUM

Phosphate (Apatite), 80% $Ca_3P_2O_8$. $30 per net ton.

CAESIUM

Silicate (Pollucite). $1 per lb.

CERIUM

Phosphate (Monazite Sand), 25–30% Ce_2O_3. $1.90 per lb. of ThO_2. Contained.

Ferro-Cerium (Pyrophoric Alloy). $28 per lb.

CHROMIUM

Chromite, 35% Cr_2O_3. $29 per net ton.

FLUORINE

Calcium Fluoride (Fluorspar), Various Grades.

Fluxing Grade, $27 per net ton.

Lead-free, Acid Grade, $30 per net ton.

Metallurgical Grade, $20 per net ton.

Ammonium Bifluoride, 27¢ per lb.

LITHIUM

Fluo-phosphate (Amblygonite). $60 per net ton.

MAGNESIUM

Carbonate (Raw Magnesite), $MgCO_3$, 95%. $35 per net ton.

Chloride. $65 per net ton.

Oxide (Calcined Magnesite), MgO 88%. $75 per net ton.

Metal, 99% pure. $3.50 per lb.

Metal, 90%. $2.65 per lb.

MANGANESE

Oxide, "Fosforlo" Metallurgical Grade, 48% metallic. Prices on request.

Oxide, "Tekniko" Grade, 75% MnO_2. Lump $60; Ground $70 per net ton.

Oxide, "Ferrolo" Grade, 80% MnO_2. Lump $80 per ton; Ground $95 per net ton.

MOLYBDENUM

Sulfide (Molybdenite). $1.70 per lb. of metal contained for 60% concentrates.

Molybdate of Lead (Wulfenite). $1.25 per lb. of contained metal.

Ferro-Molybdenum. $3.50 per lb. of metallic Molybdenum contained.

Molybdic Acid. $3.50 per lb.

STRONTIUM

Sulfate (Celestite), 90% $SrSO_4$. Lump $22 per net ton.

Carbonate (Strontianite). $85 per net ton.

TANTALUM

Tantalate of Iron (Tantalite), 65% Ta_2O_5. $975 per net ton.

THORIUM

Ore (Monazite Sand), 5% ThO_2. $1.90 per lb. of Thorium Oxide. Contained.

Ore (Thorianite), 65% ThO_2. $3 per lb.

Nitrate, 48% ThO_2. $7.50 per lb.

TITANIUM

Oxalate. 53¢ per lb.

Oxide, 95% TiO_2. $110 per net ton.

Prepared "Titanellow" Colors as follows: Standard, $4; Enamel, $4; Ceramic, $2; Potters', 40¢; Tilemakers', 12¢ per lb.

TUNGSTEN (WOLFRAM)

Acid, 97%. $2.85 per lb. of 100% WO_3 contained.

Ammonium Tungstate, 98%. $2.80 per lb.

Metallic (powder) 95%. $3.50 per lb. of metallic tungsten contained.

Calcium Tungstate, crude (Scheelite), 60% WO_3. $1200 per net ton.

Iron Tungstate, crude (Ferberite), 60% WO_3. $1200 per net ton.

Manganese Tungstate, crude (Hubnerite), 60% WO_3. About 10% less than above prices.

URANIUM

Black Oxide. $3.60 per lb.

Yellow Oxide (Sodium Diuranate). $2.50 per lb.

Ore (Carnotite). $130 per net ton.

Ore (Samarskite), 13% U_3O_8. $360 per net ton.

Ore (Pitchblende), 75% U_3O_8. $8 per lb.

VANADIUM

Ore (Vanadinite)

Ferro-Vanadium. "Niccolo" grade, $3 per lb. of contained vanadium; Niccoliferous grade, $2.75 per lb. of contained vanadium.

YTTRIUM

Silicate (Gadolinite), 30% Y_2O_3. 50¢ per lb.

ZIRCONIUM

"Zirkite," 73% ZrO_2, lump and crushed. Lump $130 per net ton; 50 or 100 mesh, $150 per net ton.

"Zirkite" Cement. 200 mesh, $170 per net ton. A plastic refractory when wet.

Silicate (Zircon), 95%. $160 per net ton.

PRICES:

At the urgent request of the Committee of the Chemical Engineering Catalog, we have included prices for less than carloads in early **SEPTEMBER (1916)**, but because of violent monthly and even weekly fluctuations, **THESE QUOTATIONS WILL OFTEN BECOME HIGHLY MISLEADING.** Carload lots are usually quoted much lower.

Send for sample copy of " MONTHLY PRICES."

THE FOXBORO CO., Inc.

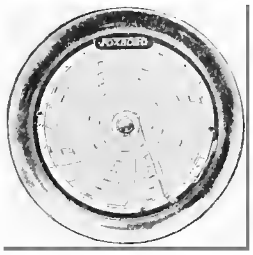
FOXBORO, MASS., U. S. A.

NEW YORK	CHICAGO	PITTSBURGH	ST. LOUIS	BIRMINGHAM	SAN FRANCISCO
50 Church St.	1363 Monadnock Bldg.	Diamond Bank Bldg.	Railway Exchange Bldg.	Brown Marx Bldg.	Sheldon Bldg.

PRODUCTS: "Foxboro" Indicating and Recording Gauges for Pressure and Vacuum, Indicating and Recording Thermometers, Automatic Temperature Controllers, Indicating and Recording Electric Pyrometers, Differential Pressure Recorders, Flow Meters for Gas and Liquid, Indicating and Recording Liquid Level Gauges, Syphon Gauges, Mercury Gauges, Recording Hygrometers, "Foxboro" Radial Planimeters, Mechanical and Electric Time Recorders, Round and Square Counters, Clocks, Indicating and Recording Tachometers, Gauge Boards.

"FOXBORO" RECORDING GAUGES:

These instruments are simple, accurate, neat, compact, efficient; can be used for steam, gas, water, air, oil, ammonia, brine, anything under vacuum or pressure; any range from full vacuum up to 20,000 lbs., any unit of measurement; inches water, ounces, pounds, feet, metric units, etc.



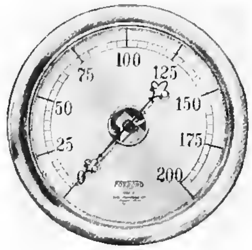
All Gauges Absolutely Dead Beat; have improved supported Helical and Diaphragm Tube Movements and Pen Arms, that are extremely simple and eliminate the effect of vibrations, —patented chart holder, micrometer adjustment on pen arm, automatic pen lifter. All cases round form dust tight. Made in three sizes, 8″, 10″, and 12″;—any finish desired.

Duplex Recording Gauges furnished to record two separate pressures on one chart.

In no other instrument will be found so many marked improvements. Twenty-five years' experience in instrument making is embodied in their construction. Complete data in Bulletin AZ–98.

"FOXBORO" INDICATING GAUGES:

We make thousands of Indicating Gauges a year, ranging in size from two to twenty-four inches in diameter and any range from full vacuum to 20,000 lbs. per square inch. All movements are absolutely Non-Corrosive and independent of the case, which means that none of the moving parts are fastened to the back of the case, but the interior movement is integral with the socket and connections. Perfect alignment of the working parts insures permanent accuracy. Twisting, jarring or temperatures on the case cannot affect the calibration.



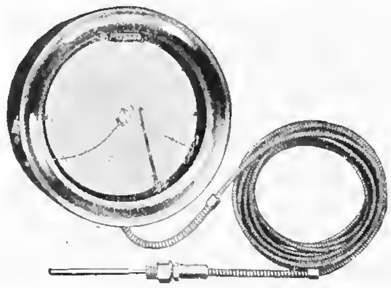
Ammonia Gauges and Hydraulic Gauges for pressures over 1000 lbs. have nickel steel, screwed tubes. Positively will not set or leak; are durable and accurate under the hardest service.

Acid Gauges. Diaphragm type unaffected by corrosive acids.

Complete description and prices in Bulletin AZ–95.

"FOXBORO" RECORDING THERMOMETERS:

These instruments are made in three sizes, 8″, 10″ and 12″, for any range of temperature from – 60 to 1000° Fht. or corresponding ranges in Centigrade or Reaumur scales. They depend upon the expansion of liquids, gas and the vapor tension of volatile liquids for their action. It is impossible for this type of instrument to deteriorate with age;—we guarantee permanency.



No mercury is used. The effect of atmospheric conditions surrounding the instrument and connecting tube is thus eliminated. Connecting tube can be 300 feet long if necessary, and accurate results guaranteed.

The construction is simple and strong, and will withstand the hardest usage. The actuating movement is our improved helical tube movement;—no multiplying devices are used. This simplicity insures accuracy and permanent calibration.

Charts can be either even scale or increasing scale as desired.

Bulbs are made to suit any kind of application. Special lead and acid resisting bulbs are made for the chemical industry.

Duplex and Triplex Recording Thermometers, to record on one chart two or three separate temperatures, can be supplied for different applications.

Bulletin No. AZ–104, the most complete bulletin on Thermometers ever published, will be sent on request.

Continued on Next Page

"FOXBORO" INDICATING THERMOMETERS:

This type of Thermometer was designed to eliminate excessive breakage, as is present in the glass bulb mercurial Thermometer, also to obtain an indicating instrument that is easy to read and of the long-distance type as well as stem type. Made for any range from — 25 to 1000° Fht., or corresponding degrees Centigrade or Reaumur.

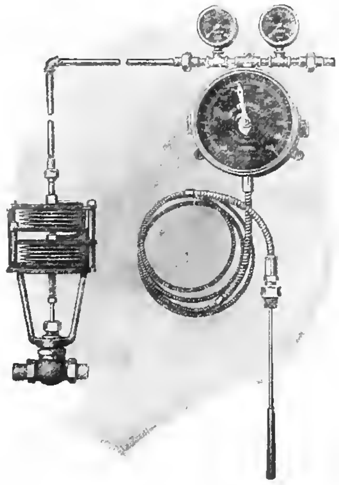
No mercury is used in this type of Thermometer. The same principle as used in our Recording Thermometer applies, except that our improved type of Bourdon Tube Gauge Movement is used.

We guarantee them to be durable, sensitive and accurate;—wide open scales, easy to read, no glass or fragile parts to break, no mercury to separate. Can be used anywhere a Thermometer is required.

Complete information Bulletin AZ–104.

"FOXBORO" AUTOMATIC TEMPERATURE CONTROLLERS:

These Controllers are the latest and simplest application of their kind on the market. They will accurately control any temperature from — 60 to 800° Fht.;—will operate any size of valve up to 12 inches;—have graduated scales;—the index hand may be set at any desired point and the regulator will automatically control the temperature at that degree without further attention. The Diaphragm Valves are operated by a vacuum or pressure whichever is available. These valves automatically close if air system fails; thereby preventing overheating.



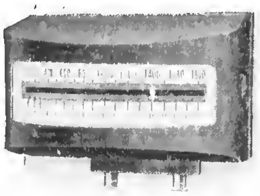
Controllers made to operate one, two or three diaphragm valves on one system. Can be equipped with clock operated cam for time control of any definite cycle of operation. Controller and Recording Thermometer can be built in combination in one case.

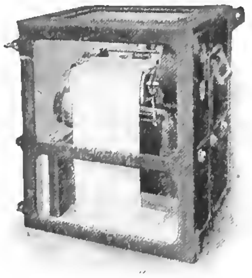
Complete information Bulletin No. AZ–112 sent upon request.

"FOXBORO" ELECTRIC PYROMETERS:

These instruments are supplied in indicating and recording types, stationary and portable forms. Indicating instruments are made for ranges up to 3000° Fht. or 0–1600° Cent., for use with base metal or platinum rhodium thermocouples;—Recorders from 0 to 1800° Fht. for use with base metal couples only.

All instruments extra high resistance. All fire bars and thermocouples absolutely interchangeable.





Base Metal Fire Bars are of special construction, extra sensitive, long lived, and can be bent cold around four-inch pipe without injury.

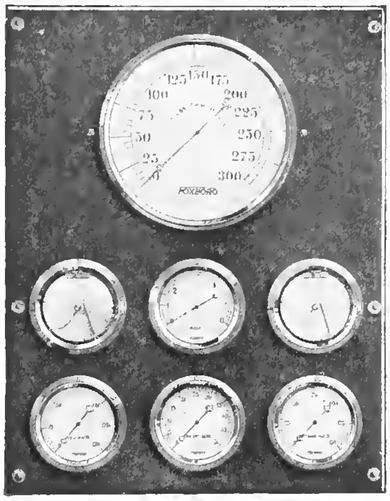
Single Pivot Type Galvanometer used, instruments do not require leveling.

Recording Pyrometer or "Tapalog" will record automatically one to six separate temperatures on one chart. No ink to blot;—no friction on galvanometer;—continuous tape chart. Built to work;—nothing delicate about it, and is enclosed in a case which is absolutely moisture and dust tight.

This is the very latest and most improved Electric Recording Pyrometer made, and is free from all trouble previously encountered in instruments for this purpose. Send for Bulletin No. AZ–108.

GAUGE BOARDS:

We are equipped to supply Gauge Boards of every description, complete in every respect, made from any material desired;—wood, slate, marble or metal, to match General Electric or Westinghouse Panels.



Note that we can supply Indicating and Recording Gauges, Thermometers, Clocks, Counters, etc., all in the same style of case and finish, making a uniform Board in every respect.

Illustration shows our Flush Type instruments; as supplied on a Board for Curtis Bay Chemical Company.

Let us figure on your requirements;—a first-class job is guaranteed.

OTHER INSTRUMENTS:

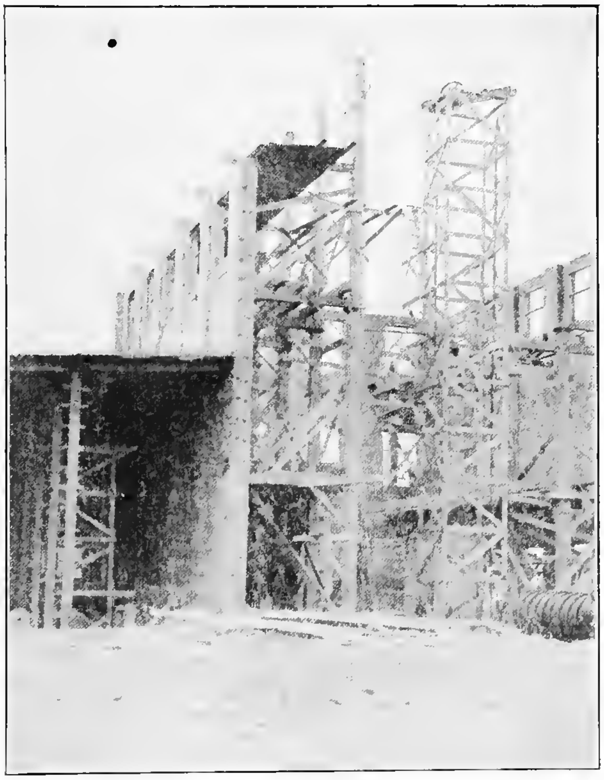
Differential Pressure Recorders and Flow Meters	Bulletin No. AZ– 86.
Liquid Level Gauges	Bulletin No. AZ–107.
Syphon and Mercury Gauges	Bulletin No. AZ–113.
Hygrometers	Bulletin No. AZ–103.
Radial Planimeters	Bulletin No. AZ–101.
Mechanical and Electric Time Recorders	Bulletin No. AZ–102.
Round and Square Counters and Clocks	Bulletin No. AZ– 95.

THE FOUNDATION COMPANY

NEW YORK CHICAGO PITTSBURGH
SAN FRANCISCO

SERVICES:

The design of complete plants for chemical industries, including the installation of all equipment, both chemical and power.

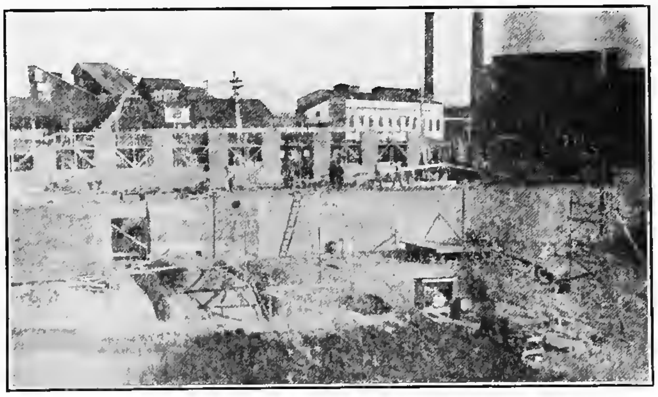


INSTALLING CHLORINATION APPARATUS, KINGSPORT, TENN.

SETTING CAUSTIC POTS, PITTSBURG, CAL.

CHEMICAL PLANTS:

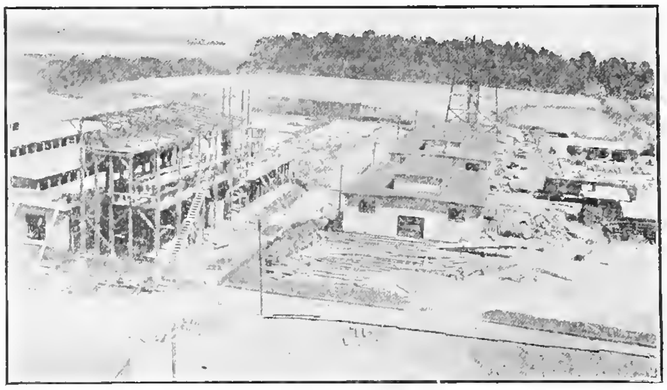
We are building this year five plants for the manufacture of chlorine products and alkali. Our knowledge of the material market in purchasing, and our experience in actual construction work, make it possible for us to build these and other chemical plants with the greatest speed, economy and efficiency.



CONSTRUCTION UNDER WAY, BREWER, MAINE.

CO-OPERATION:

Chemical engineers contemplating the design of large plants will find it profitable to consult us on this class of construction.



PLANT UNDER CONSTRUCTION, PITTSBURG, CAL.

HYDRO-ELECTRIC DEVELOPMENTS:

Our experience in the construction of dams, intakes and other parts of large hydro-electric development projects makes our services of special value to engineers designing and erecting electrochemical plants, pulp and paper mills and other large industrial chemical works.

WM. GAERTNER & CO.

5345-49 LAKE PARK AVE., CHICAGO

PRODUCTS: Laboratory Apparatus; Measuring Microscopes; Comparators; Cathetometers; Spectroscopes; Spectrometers; Spectrophotometers; Chronographs; Recording Drums; "Scientia" Calorimeters; Universal Laboratory Supports.

PHYSICAL APPARATUS FOR USE IN CHEMICAL LABORATORIES:

The time is long past when all that was required in the chemical laboratory was a lot of beakers, flasks and test-tubes together with some heating, weighing and measuring apparatus.

Today the finest physical methods are called into play in the solution of chemical problems and the control of works operations. Consequently microscopes, spectroscopes and spectrometers are required in many chemical laboratories and we will be pleased to furnish detailed information and prices regarding any of our apparatus mentioned below, and also to undertake repairs and special work for which our factory is well equipped.

CHARACTERISTIC FEATURES OF OUR APPARATUS:

Original designs of great simplicity.
Good workmanship and great durability.
Convenience in adjustments and use.
Optical parts of highest quality.
Accuracy of linear circular divisions.
Reasonable prices.

CATHETOMETERS:

In respect to accuracy of scale, straightness of guides, optical quality of telescopes and convenience in use we claim that our cathetometers are the equal of anything made in this line and invite the most critical inspection.

MEASURING MICROSCOPES:

These microscopes are intended for physical and mechanical measurements requiring an instrument of considerable magnifying power and rigidity.

COMPARATORS:

These instruments are simple in construction and suited to the rapid measurement of spectra photographs, gratings, divided scales, etc.

TIME RECORDING INSTRUMENTS: CHRONOGRAPHS.

We have furnished a large number of these instruments to observatories, physical laboratories and commercial concerns. In respect to convenience, accuracy and compactness we claim this to be superior to any other chronograph on the market.

RECORDING DRUMS:

Slow or rapid speed; belt-driven or operated by hand.

SPECTROMETERS, SPECTROSCOPES AND SPECTROPHOTOMETERS:

We are prepared to meet the demand for instruments of thorough workmanship and high accuracy at a moderate price.

THE IMPROVED "SCIENTIA" BOMB CALORIMETER:

With Vacuum Insulation.

This instrument serves for determining the heating value of fuels quickly and exactly. Designed particularly for industrial use. In place of the outside double-walled calorimeter vessel, a vacuum insulated vessel is employed which gives a much higher insulation and places the apparatus in smaller and more compact form.

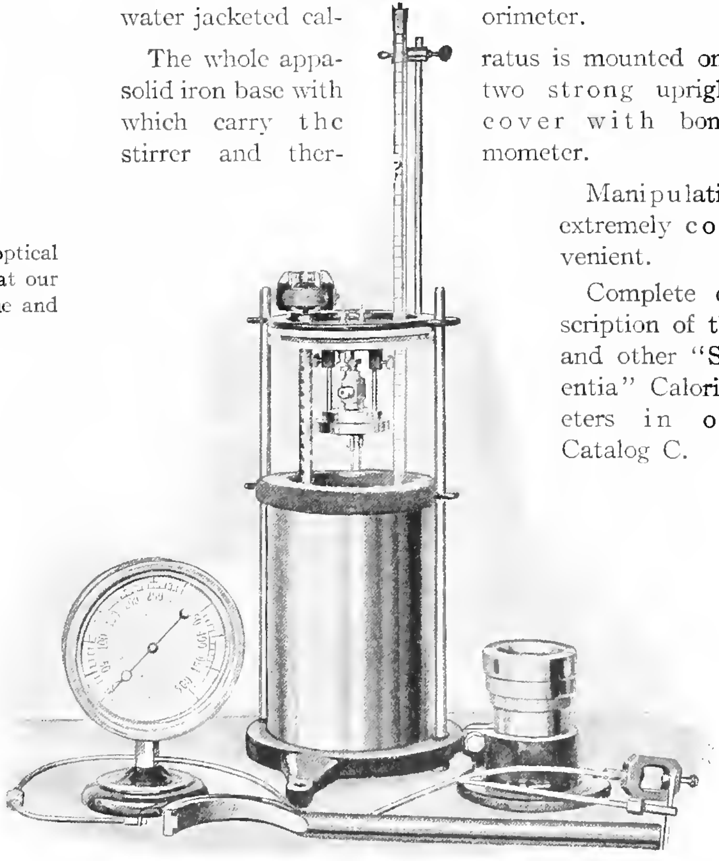
The complete bomb calorimeter outfit consists of:
Steel bomb having one or two valves.
Pressure Gauge.
Motor Stirrer.

Nickeled outside jacket with felt lining and vacuum vessel. Heat insulation of this apparatus is about *three times greater* than that of the ordinary water jacketed calorimeter.

The whole apparatus is mounted on a solid iron base with two strong uprights which carry the cover with bomb, stirrer and thermometer.

Manipulation extremely convenient.

Complete description of this and other "Scientia" Calorimeters in our Catalog C.



"SCIENTIA" BOMB CALORIMETER

GENERAL ELECTRIC COMPANY

Manufacturers of Complete Electrical Power Plant Equipments and Supplies

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For TEXAS, OKLAHOMA and ARIZONA business refer to Southwest General Electric Company (formerly Hobson Electric Co.). Dallas, Houston, El Paso, Tex., Oklahoma City, Okla. For HAWAIIAN business address Catton Neill & Company, Ltd., Honolulu. For all CANADIAN business refer to Canadian General Electric Co., Ltd., Toronto, Ont. For business in GREAT BRITAIN refer to British Thomson-Houston Co., Ltd., Rugby, Eng.

FOREIGN OFFICES OR REPRESENTATIVES:

Argentina: Cia. General Electric Sudamericana, Inc., Buenos Aires; **Australia:** Australian General Electric Co., Sydney and Melbourne; **Brazil: Companhia** General Electric do Brazil, **Rio** de Janeiro; **Central America:** G. Amsinck & Co., New York, U. S. A.; **Chile:** International Machinery Co., Santiago, and Nitrate Agencies, Ltd., Iquique; **China:** Andersen, Meyer & Co., Shanghai; **Colombia:** Wesselhoeft & Wisner, Barranquilla; **Cuba:** Zaldo & Martinez, Havana; **England:** General Electric Co. (of New York), London; **India:** General Electric Co. (of New York), Calcutta; **Japan** and **Korea:** General Electric Co. and Bagnall & Hilles, Yokohama; Mitsui Bussan Kaisha, Ltd., Tokyo and Seoul; **Mexico:** Mexican General Electric Co., Mexico City; **New Zealand:** The National Electrical & Engineering Co., Ltd., Wellington, Christchurch, Dunedin and Auckland; **Peru:** W. R. Grace & Co., Lima; **Philippine Islands:** Frank L. Strong Machinery Co., Manila; South **Africa:** South African General Electric Co., Johannesburg, Capetown and Durban.

PRODUCTS:

Complete Electrical Power Plants

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TURBINES AND GENERATORS:

Curtis turbo-generators are built in all sizes for condensing or non-condensing service in high pressure, low pressure, or combined high and low pressure types.

SWITCHBOARDS:

Ordinary switchboard requirements may be met by the selection of panels from the company's catalog of Standard Unit panels. Special switchboard equipment will be made to order.

FLOW METERS:

The General Electric flow meter is furnished for making reliable measurements of the flow of water, air, steam, or gas. It is most valuable in the boiler room.

MOTORS:

Chemical plants impose few conditions which cannot be overcome by specially designed motors to work in acid or alkaline vapors, excessive alkaline dust or in high temperatures up to 150° Centigrade.

LAMPS, WIRE, WIRING DEVICES:

Electric incandescent lamps, wire, wiring devices and cable with coverings of cotton, asbestos, lead and steel armor are available in standard forms. From this assortment, lamps and accessories applicable to nearly every purpose may be selected.

TRANSFORMERS:

Transformers for the usual low voltages used in electrochemical work are often kept in stock, and may be shipped without the delay incidental to winding special transformers.

MOTOR-GENERATORS:

Motor-generators for electrolytic work are built to fit every requirement of the chemical workshop. An illustrated bulletin giving complete data on this equipment will be sent on request.

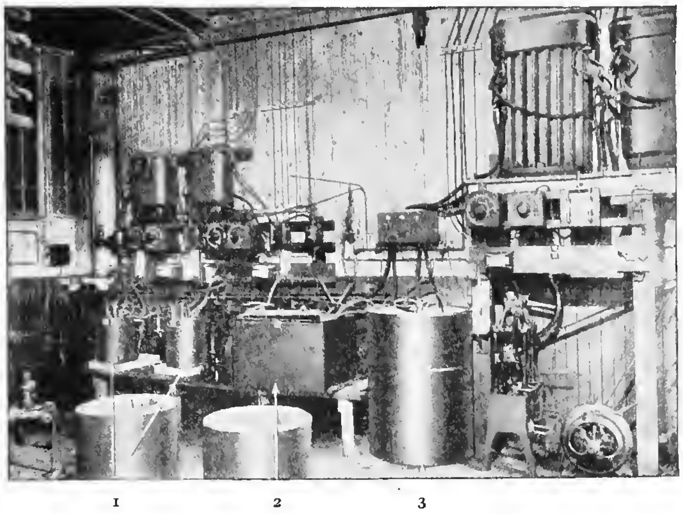
BULLETINS AND SERVICE:

A complete line of the company's electric apparatus for the powerhouse is illustrated and described in special bulletins which will be sent on request. Specialists employed in the branch offices of the company are available to those who are planning electric installations.

Continued on Next Page

ARSEM VACUUM FURNACE:

The general design of the furnace comprises a heater enclosed in a vacuum chamber, the heater being of such shape that it almost entirely encloses the object to be treated. Two types are made, one a vertical type with a graphite helix in an upright position for a heater and the other a box type with four graphite grids as a heater.

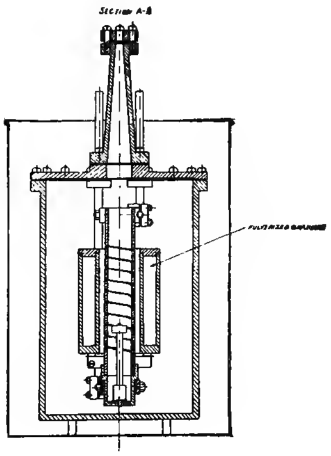


ARSEM VACUUM FURNACE

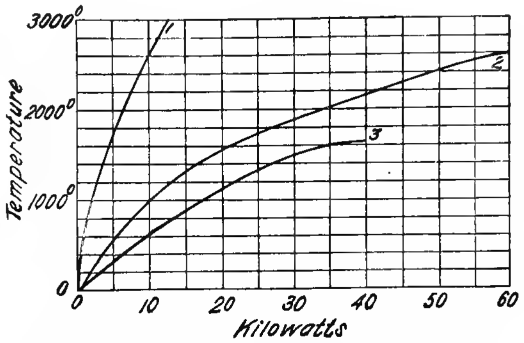
1. Two Small Vertical Furnaces
2. Box Type Furnace
3. Large Vertical Furnace

The vacuum chamber is of steel with all joints made tight by lead gaskets. Radiation screens are used to diminish the amount of heat lost by direct radiation from the heater, thus increasing the efficiency of the heater. Windows are provided for observation of the behavior of the article being heated. Of the various uses which suggest themselves, the following may be mentioned:

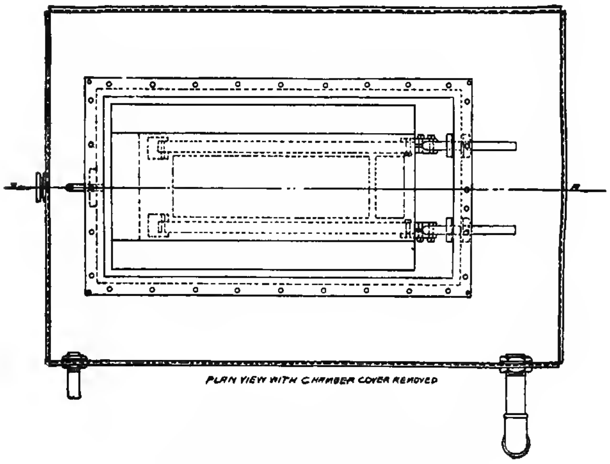
1. Preparation of metals, alloys and various compounds.
2. Determination of melting points by an optical pyrometer or by reference to the furnace calibration curves.
3. Calibration of optical pyrometers.
4. Distillation of refractory substances for separation or purification.
5. Study of equilibrium in the reaction depending upon the pressure of the gaseous phase.



VERTICAL ARSEM FURNACE



PERFORMANCE CURVE ARSEM FURNACE
1. Small vertical 2. Large vertical 3. Box type



BOX TYPE ARSEM FURNACE

The following table gives the essential details in regard to the power, the size of furnace and size of crucible which can be used.

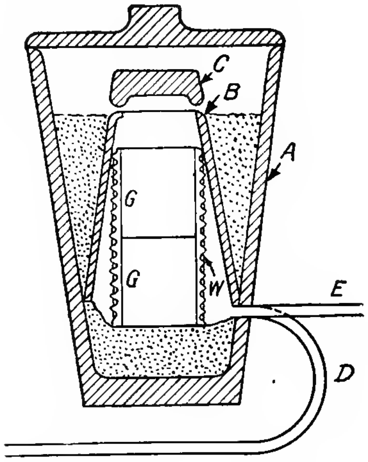
TABLE OF FURNACE DATA

	Small Vertical	Large Vertical	Box Type
Maximum kilowatts	15	60	40
Maximum current, amperes	250	800	570
Maximum voltage	60	75	70
Maximum temperature	3100 deg.	2600 deg.	1700 deg.
Crucible volume	5 cu. in.	125 cu. in.	344 cu. in.
Crucible height	4 in.	10 in.	8 in.
Crucible section	1¼ in. diam.	4 in. diam.	4 in. by 12 in.
Height of furnace	21 in.	48 in.	24 in.
Base of furnace	15 in. diam.	36 in. diam.	24 in. by 36 in.

Continued on Next Page

MOLYBDENUM WOUND FURNACE:

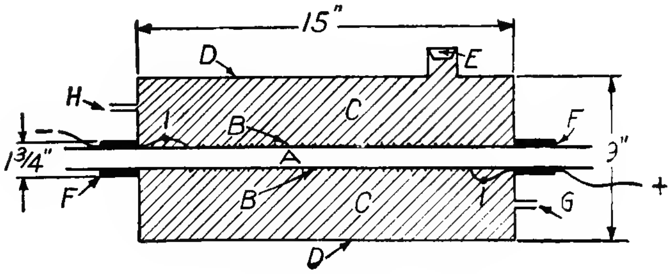
If a simple furnace is desired which can be run higher than the melting point of iron and in which substances can be heated without taking up either carbon or oxygen the molybdenum wound furnace described herewith will be found useful. There are two types, the crucible and the tube furnace.



A, Battersea crucible
B, Inverted Battersea crucible
C, Crucible bottom used as cover
D, Hydrogen supply pipe
E, Copper connection to winding
G, Alundum cylinder
W, Molybdenum heating wire

MOLYBDENUM CRUCIBLE FURNACE

The crucible furnace consists essentially of a helix of molybdenum wire supported by an alundum tube, the container for the charge to be heated being a small crucible placed inside of the alundum cylinder. An inverted Battersea crucible with the bottom cut off is placed over the helix and the two placed in another Battersea. The space at the bottom and between the sides of the inverted Battersea and the outside container is filled with powdered silica. This furnace may be run safely up to 1700 deg. C. and at this temperature it calls for 40 volts and 50 amperes.



MOLYBDENUM TUBE FURNACE

A, Alundum tube
B, Molybdenum heating wire
C, Powdered silica packing
D, Metal casing
F-F, Asbestos wool to prevent escape of hydrogen
H-G, Hydrogen inlet and outlet
I-I, Copper leads to heating wire

The tube furnace consists of a porcelain or an alundum tube wound with molybdenum foil. Around the tube is a tight metal casing filled with powdered silicon. With this a temperature of 1600 deg. C. is readily obtained with 80 volts and 14.3 amperes. Both of these furnaces are adapted for heating the charge in an atmosphere of hydrogen.

METALLIC BORON:

On account of its negative temperature coefficient of resistance pure boron should be very interesting for a number of purposes. It is obtainable in the form of rods or filaments from .004" in diameter up to .150"; other sizes being possible. Such material is not ductible, has a melting point of approximately 2400 deg. C., may be soldered to other substances, but gives better joints if welded. The resistivity at 21 deg. C. (70 deg. F.) is about .2 megohms per centimeter cube. If other substances are added this drops rapidly. The temperature coefficient of resistance is approximately −.0037 deg. C. (−.0068 deg. F.).

TUNGSTEN CONTACTS:

Tungsten has been found superior to platinum for use as a contact in relays, interrupters and other make and break devices, in the majority of cases. Its chief advantages as a contact over other metals are its extremely high melting point, hardness, its heat conductivity, low vapor pressure, freedom from sticking and its very long life. The contacts are made by attaching a disc of tungsten to an iron base and can be furnished in a number of sizes.

BOROFLUX:

Boroflux is a deoxidizer used primarily for casting mechanically sound copper of high electrical conductivity. Copper deoxidized by this flux may be cast in green, dry sand or metal moulds as readily as brass. Under extremely careful conditions a conductivity of 95% is possible while 90% is comparatively easily obtained. Under good commercial foundry conditions 85% or better is obtained uniformly.

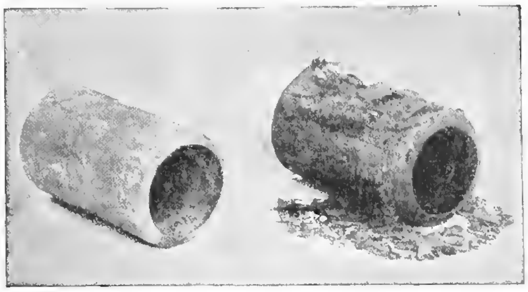
The success of the flux is due to the fact that gases absorbed by the molten copper have a greater affinity for boron, the active element of the flux, than for the copper, and therefore combine with the boron. The boron will not combine or alloy with the copper. One-half of one per cent. of flux is used, one-half pound to 100 pounds of molten copper, the reaction taking place at 1300 to 1380 deg. C. This temperature is essential to obtain a proper reaction.

CALORIZING OF METALS:

This process consists of a heat treatment of iron, steel, copper, brasses or bronzes with a mixture containing aluminum powder. The resultant surface obtained upon the metal in the case of iron and steel is an aluminum-iron alloy; in the case of copper, brass or bronze it is an aluminum bronze surface. The treatment does not materially affect the characteristics of the metal except that the surface is made considerably harder and is very resistant against oxidization at high temperatures. The temperatures at which calorized iron may be operated successfully range up to

Continued on Next Page

1000 or 1100 deg. C., but the added life of the material is inversely proportional to the temperatures to which it is subjected.

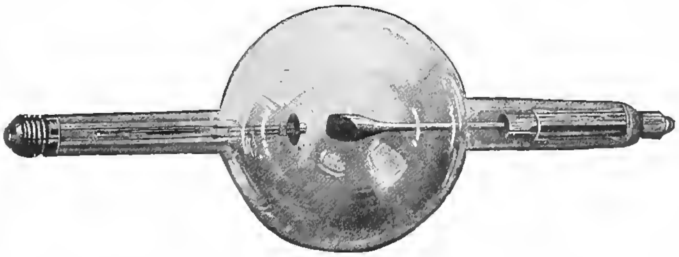


EFFECT OF HEAT ON CALORIZED AND UNCALORIZED METAL

The process is particularly valuable up to 1000° deg. C. and is successfully applied to annealing boxes, soot cleaners, pyrometer tubes, iron retorts, copper condenser tubes, boiler fittings, etc. The accompanying cut shows the effect of heat on a piece of calorized and uncalorized iron pipe, operated in a gas furnace for 100 hours at a temperature of 800° Centigrade.

COOLIDGE X-RAY TUBES FOR METALLURGICAL RESEARCH:

Experimental work to determine the soundness of castings by means of a Coolidge X-ray tube seems to indicate that metallurgists may find this method very helpful along certain lines of investigation. The results obtained are limited by the thickness of the parts to be examined, but under favorable conditions blowholes and similar defects can be readily demonstrated.



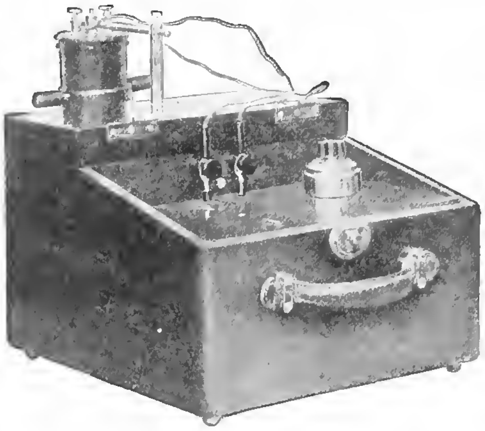
COOLIDGE X-RAY TUBE

In the majority of cases a radiograph is necessary, but mica and other similar substances may be examined fluoroscopically. Where the method is applicable it will probably be useful for the examination of intricate castings where usual methods of inspection by taking iron sections would destroy the piece.

The Coolidge tube consists of a tube exhausted to a pressure of not more than a few hundredths of a micron (a micron is 0.001 mm.) in which is supported the cathode so arranged that it may be heated electrically, an electrically conducting cylinder or ring connected to the heated cathode and so located with reference to it as to focus the cathode rays on the target, and the anti-cathode or target which functions as an anode.

ULTRA-VIOLET RAY APPARATUS:

The high tension disruptive electric spark between iron terminals is very rich in ultra violet radiation covering about 80% of that part of the spectrum which is useful for producing fluorescent effects. A number of metals other than iron have been used for electrodes, but while some of these produce more intensive radiation than iron in certain regions of the ultra-violet spectrum, they fail to produce any rays of useful power in other regions, whereas iron shows a more uniform distribution throughout the entire range.



ULTRA-VIOLET RAY APPARATUS

Iron electrodes have therefore been adopted for use in an outfit recently designed, especially for the production of fluorescent effects, but these electrodes can be readily exchanged for others of different metal that may be desired for some special purposes.

The outfit comprises a small 60-cycle 110/220/4000 volt transformer, condenser, adjustable spark gap and sundry fittings all mounted in a mahogany box for convenience. As the device only uses about 250 to 300 watts it may be safely connected to any lighting circuit.

Adjusting screws are provided so that the operator may vary the frequency of the spark from 120 per second up to 10 or 20 times this value. Although small, the outfit produces an abundance of ultra-violet radiation with which a number of very interesting fluorescent effects may be produced. It should prove especially valuable in physical and chemical laboratories and in many branches of research. The effect of ultra violet radiation in assisting in the catalysis of solutions may be also studied with advantage by means of this apparatus.

Continued on Next Page

PORCELAIN FURNACE TUBES:

During the past two years the results of some very extensive tests on porcelain furnace tubes in comparison with tubes of imported make have shown that this ware is equally satisfactory with the added advantage of much longer life. The standard size is 48″ long, 1⅞″ inside diameter and 2⅜″ outside diameter. Variation of the thickness of the wall can be made.

MISCELLANEOUS SPECIAL PRODUCTS:

There are a number of special products which can be supplied which are mainly desirable for experimental use, such as pure argon gas, metallic calcium, metallic lithium, silicium tetrachloride, titanium tetrachloride and quartz tubing. Magnesia crucibles 1⅜″ diameter and 3½″ high can also be furnished.

GEN-EL-ITE:

Investigation of the lubricating properties of metals has enabled us to produce a bearing metal which has self-lubricating properties suitable for many applications where oil is objectionable or difficult to supply and where the bearing may be subjected to rather high temperatures.

The material is pressed to shape and in case of sleeve bearings the inside diameter can be held sufficiently close so that after being in position it can be reamed to size. Owing to the special nature of the material each application must be considered individually and further details will be supplied upon request.

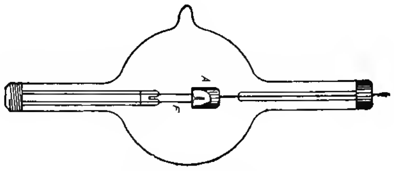
INSULATIONS AND MOULDED COMPOUNDS:

Owing to the large variety available no attempt will be made to describe the different types of insulations and moulded compounds in detail. These cover, however, all types of porcelain insulators, asbestos compounds, mica and mica compound, shellac and varnish compounds, oils, paper, fibre, rubber and other moulded compounds. With these combinations practically all degrees of dielectric strength, heat insulation, mechanical strength, etc., can be obtained for different purposes.

KENOTRON:

Laboratories will find kenotrons valuable for producing direct current at very high voltage for spectroscope work, operating small discharge tubes and for testing the dielectric strength of insulations.

Although the kenotron is similar to other hot cathode rectifiers in that it consists of two electrodes in an exhausted tube one of which is heated from an external source, the current obtained, however, does not vary as the vacuum is constant and the cathode does not disintegrate. Investigation of these difficulties encountered in previous forms of this type of rectifier developed the fact that by adopting certain methods of treatment and by the use of high vacua a hot cathode high voltage rectifier could be produced to operate successfully.



KENOTRON

These rectifiers can now be obtained for the rectification of voltages up to 90,000 peak value. When used on the half wave basis they have a current capacity of 100 milliamperes which can be increased to 250 milliamperes if condensers are used to smooth out the wave form.

METALLIC MAGNESIUM:

In the foundry magnesium will be found useful for scavenging purposes and very desirable in the manufacture of aluminum alloys. This metal can be supplied in either ingot or powder form 99% pure. The ingots are approximately 20″ long and 1½″ in diameter. The powder is graded according to the mesh sizes which run from a 40 mesh size up to 200 or what is generally called impalpable powder.

MOLYBDENUM WIRE:

Molybdenum wire will be found very suitable for use as a heating element in muffle furnaces. This wire can be furnished in standard diameters .010″ to .060″. The melting point of molybdenum is approximately 2500 deg. C. with oxidization occurring at red heat. Its resistivity at 20 deg. C. is 4.1 microhms per centimeter cube and the temperature coefficient per degree between 0 and 170 deg. C. is .005. The chemical properties are as follows:

Slowly dissolves in hydrochloric acid at 110 deg. C.

Is not attacked by dilute sulphuric acid.

Dissolved slowly by concentrated sulphuric acid.

Dissolved rapidly by dilute nitric acid.

Dissolved slowly by concentrated nitric acid.

Dissolved rapidly by aqua regia.

Not attacked by hydrofluoric acid.

Not attacked by potassium hydroxide but is soluble in fused alkali.

Metal becomes coated after a time in acids with an acid resisting oxide.

THE GEDGE-GRAY CO.

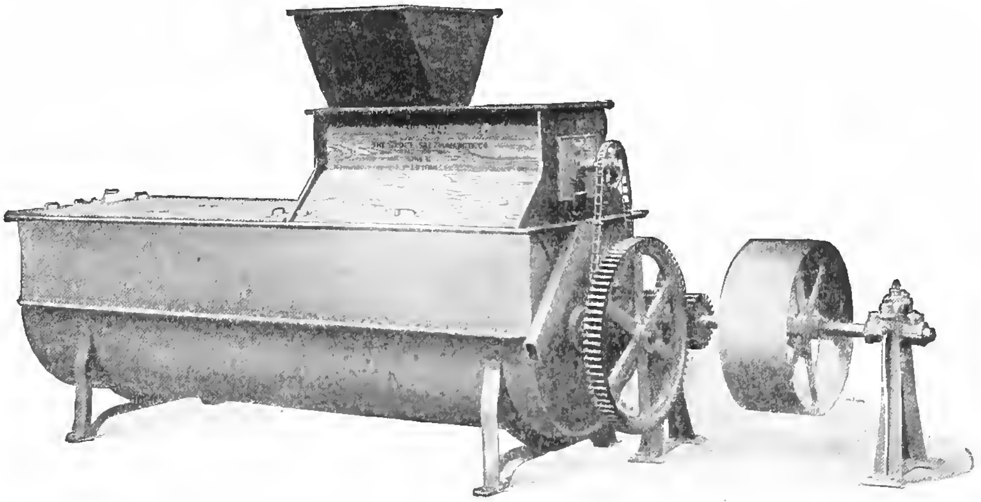
Manufacturers of Sifting & Mixing Machinery

LOCKLAND, OHIO

PRODUCTS: Sifting Machinery; Mixing Machinery; Paint and Liquid Mixers.

We are manufacturers of all kinds of Sifting and Mixing Machinery, for the rapid and economical sifting and mixing of dry or powdered materials, also mixers for paste, semi-paste or liquids. Our machines are built with jacketed tanks for heating or cooling materials when desired, they can also be furnished with open steam jets for boiling materials while being mixed.

Special machines designed and built for difficult mixing operations.

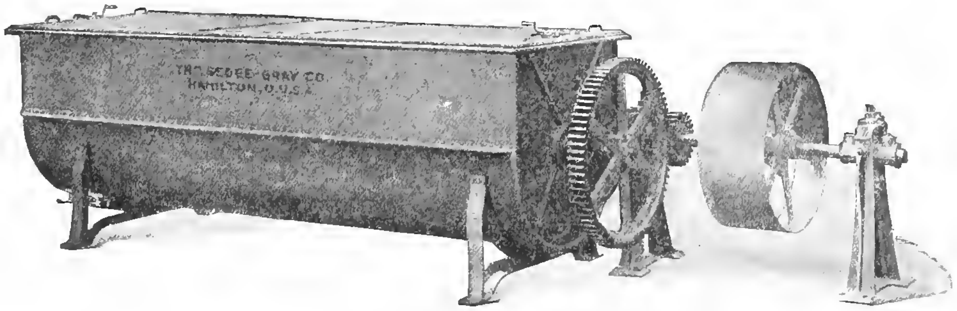


GARDNER'S PATENT COMBINED "RAPID" SIFTER AND MIXER

GARDNER'S COMBINED RAPID SIFTER AND MIXER:

The Sifter and Mixer is composed of a specially designed brush revolving over a wire screen. The construction of this brush is such that any lumps that may have formed in the material are rapidly reduced and the material is sifted through the screen into mixing chamber. All foreign matter or unreduced material is carried to the discharge end of the sifter where it is automatically forced out the tailing spout, thus making the machine self-cleaning.

The mixing chamber contains a spirally constructed agitator, having baffle plates so arranged on the spirals and reverse or hold-back flights so proportioned that the material is worked back and forth while at the same time revolving, thus insuring a perfect mix throughout the entire mass.



THE GARDNER MIXER

The sieve and brush on the Gardner machine can be instantly removed if it is desired to change the size of screen.

THE AGITATOR OF THE GARDNER MIXER GIVES THE MOST PERFECT BLEND OF ANY MACHINE KNOWN.

GENERAL CHEMICAL COMPANY

25 Broad St.
NEW YORK

Philadelphia Cleveland
New York Pittsburgh
Chicago Buffalo
San Francisco Syracuse
Providence Easton
St. Louis Bridgeport

PRODUCTS: Commercial Chemicals.

ACIDS:

- Acetic Acid
- Arsenic Acid
- Electrolyte (Sulphuric Acid)
- Hydrochloric (Muriatic Acid)
- Hydrofluoric Acid
- Hydrofluosilicic Acid
- Mixed Acid (Sulphuric and Nitric)
- Nitric Acid
- Phosphoric Acid
- Polishing Acid (Sulphuric, Muriatic and Nitric)
- Sulphuric Acid
- White Acid (Ammonium Fluoride and Hydrofluoric Acid)

ALUM:

- Ammonium Alum
- Potash Alum
- Sulphate of Alumina
- Sodium Aluminum Sulphate
- Chloride of Alumina

AMMONIA:

- Ammonium Bifluoride
- Ammonium Chloride (Sal Ammoniac)

COPPER:

- Nitrate of Copper
- Sulphate (Blue Vitrol)

IRON:

- Copperas Nitrate
- True Nitrate
- Sulphide
- Ore (Desulphurized Cinder) Nodulized. For blast furnaces. Contains less than .15% Sulphur.

LEAD:

- Acetate
- Sulphate

MAGNESIUM:

- Sulphate (Epsom Salts)
- Fluosilicate

MERCURY:

- Nitrate

SODIUM:

- Bisulphite, Anhydrous
- Bisulphite, Solution
- Bisulphate (Nitre Cake)
- Caustic Soda Solution
- Sulphate (Glauber's Salt)
- Sulphate Anhydrous (Salt Cake)
- Hyposulphite
- Carbonate (Sal Soda)
- Silicate
- Phosphate—Di
- Phosphate—Tri
- Fluoride
- Sulphide
- Sulphite

TIN:

- Bichloride of
- Nitro and Oxymuriate of
- Crystals (Stannous Chloride)
- Hydrate of

ZINC:

- Chloride of

C. P. CHEMICALS:

Baker and Adamson line of C. P. acids, salts and reagents.

PHOTOGRAPHIC CHEMICALS:

GENERAL FILTRATION COMPANY, Inc.

Cutler Building
ROCHESTER, NEW YORK

PRODUCTS: Filtros Plates, Filtering, Aerating and Agitating Mediums; Electro-Filtros Acid Proof Diaphragms; Robacher Filtros Wheel, Continuous Rotary Vacuum Filter Wheel.

DESCRIPTION:

FILTROS porous plates are composed essentially of silica and are unaffected by acids, organic and inorganic, hydrofluoric excepted, and the neutral solutions. Strong hot sodium and potassium hydroxide solutions will disintegrate this ware.

FILTROS plates are uniformly porous throughout and uniform with respect to each other. They will give uniform filtration as well as uniform diffusion, aeration and agitation.

The plates are made in the standard stock size 12 x 12 x 1½″ in coarse, medium, fine and dense grades of porosity. Special porosities and sizes are made upon order.

APPLICATION: Filtration.

FILTROS plates are used for filtering sulphuric, phosphoric, hydrochloric, carbolic, nitric, acetic, citric, mixed nitric and sulphuric and such like acids. Calcium sulphate, arsenic sludge, calcium chloride, ferric hydroxide, picric acid, calcium carbonate, trinitrotoluene, potassium chlorate, calcium acetate, acid leached ores, flotation concentrates, electrolyte sludge, cyanide pulps, sulphur blacks, aniline oil sludge, copper sulphate and similar solids are separated from the solutions by FILTROS porous plates.

Producer Gas, hydrochloric acid gas, carbon dioxide, sulphur dioxide and air are filtered through FILTROS.

AERATION AND AGITATION:

This ware is used for diffusing air in the aeration and agitation of ore by the cyanide process. It is also used for diffusing carbon dioxide in the carbonating of liquors; for diffusing sulphur dioxide gas in the manufacture of sulphurous acid.

FLOTATION:

FILTROS uniformly porous plates are used for the even uniform diffusion of air in flotation cells.

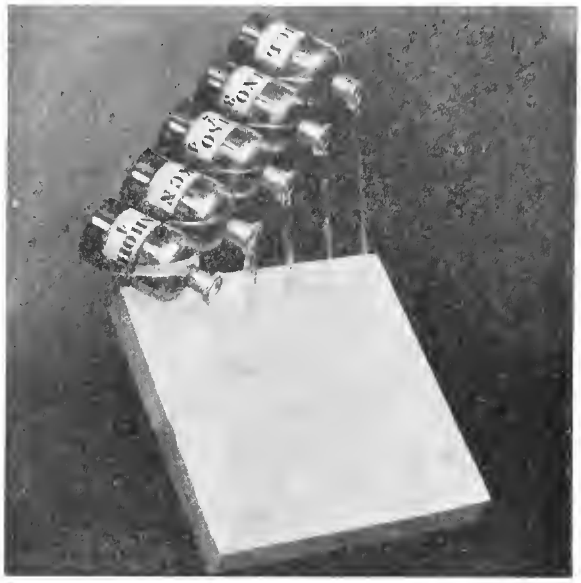
SEWAGE PURIFICATION:

In the activated sludge process of sewage treatment, FILTROS plates are installed for diffusing and distributing the air.

INSTALLATION:

FILTROS plates are readily joined by suitable cements or caulking materials to give any desired filtering, aerating or agitating area. While machined with difficulty, they can be turned to fit circular tank bottoms and the trays of acid-proof stoneware suction filter jars. Blue prints showing installation of acid-proof filter tanks are furnished upon request.

FILTROS IS ACID-PROOF



ELECTRO-FILTROS:

Electro-Filtros acid-proof diaphragms are used for electrolytic separations in acid electrolytes. They permit ionic diffusion and at the same time prevent rapid percolation of the anolyte and catholyte. The largest size is 12 x 12″, thickness, varying from ½″ to 1″.

ROBACHER FILTROS WHEEL:

A Continuous Rotary Vacuum Filter for dewatering mill tailings, flotation concentrates, auto-clave sludges, bleach liquors, fillers, cyanide pulps, lime sludges, mine waters and such like materials and solutions and for any commercial filtration where the pulp contains or can be thickened so as to contain 10% or upwards of insoluble solids.

The Filtros Wheel is 10′ in diameter by 8″ in width, and has a filtering area of approximately 145 sq. ft. It filters on the two faces at the same time. It is operated automatically and requires the minimum amount of attention.

The filtering medium is permanent and does not require constant replacement. At every revolution of the wheel the filtering medium is automatically backflushed, thus presenting a new surface as it enters the sludge tank. This device occupies a small space and is a decided labor-saving filter.

CATALOGUES:

Descriptive matter on any or all of the above materials, furnished on request.

GERDES & COMPANY, Inc.

Engineers, Founders, Machinists and Coppersmiths **Steel Plate Construction**

36 Church St.
NEW YORK CITY
Works: Lebanon, Pa.

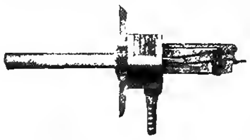
Telephone
Cortland 7673

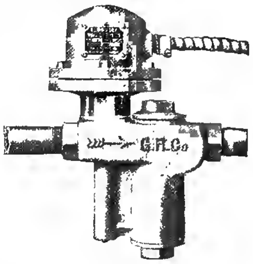
Western Union Code
Cable Address: Gerdesco, N. Y.

PRODUCTS: Autoclaves, Blowing Engines; Brass, Iron and Steel Castings; Cars and Track for all Industries; Chains; Char Filters; Chemical Equipment; Cinder and Ladle Cars; Coils; Coppersmiths; Cowls and Fume-Hoods; Crushing and Pulverizing Machinery; Crystallizers; Defecators; Downdrafts; Dryers; Evaporators, Single and Multiple Effects; Filter Presses; Forgings, Pattern and Machine Work; Gears, Cast and Cut; Gears, Special; Granulators; Hydrated Lime Plants; Kilns; Laboratory Ventilators; Lead-Lined Tanks; Lime Kilns; Pipe Coils; Pulverized Coal Burners; Raw Hide Pinions; Retorts; Special Castings and Steel Plate Work; Stills; Sugar Machinery; Tanks; Temperature Controllers; Thermostats; Vacuum Pans. Special apparatus and machinery built complete according to engineers' blueprints and specifications.

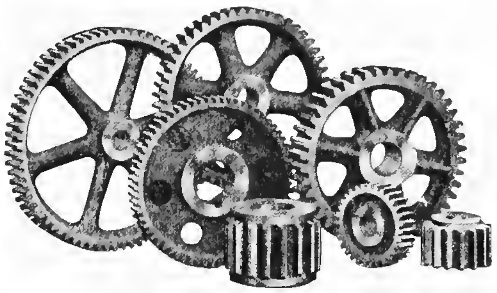
ELECTRICAL INDUSTRIAL TEMPERATURE CONTROL FOR ALL PURPOSES:

Accurate, positive, and sensitive control of steam, gas, gas-blast, oil, coal, and electric heat, in gases, liquids, and molten materials, and of chilled air, brine, and ammonia, in refrigeration. Positive regulation within 1 to 2 degrees, from 0° F. to 1800° F.

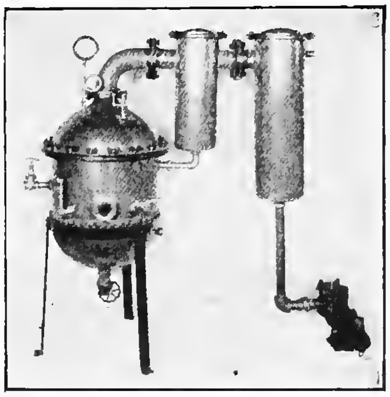




Equitherm Controllers, Valves, and Electrical Appliances designed and built to meet your special requirements.



GEARS: CAST, CUT, MACHINE MOULDED. RAWHIDE PINIONS, "DUXHIDE" PINIONS, OIL PROOF AND WATER PROOF.



DISTILLING APPARATUS

STILLS, EVAPORATORS, VACUUM PANS, COPPER COILS, CHEMICAL APPARATUS, AND MACHINERY:

We design and manufacture any of the above equipment for use in cement mills, paint mills, sugar mills, and chemical plants.

PULVERIZED COAL BURNERS AND FEEDERS:

These burners and feeders possess the following features not found in any other burner now in the market. They give absolute and positive control of feed, prevent flooding and are fitted with regulator to control point of ignition. They can be installed in any plant in connection with the apparatus now in use.

GERDES ELECTRIC WINDOW VENTILATORS:

These ventilators are exactly what is required for laboratories where ventilation is necessary and drafts must be prevented because of their disturbing action on flames, instruments of precision, etc. These ventilators bring in invigorating cold air without heating and diffuse it without draft.

REFERENCES

Silk Assn. of America, N. Y.
Taylor Instrument Co., Rochester, N. Y.
New York Edison Co.
Rubber Club of America, N. Y.
Schieffelin & Co., New York
Street Railways Advertising Co., New York
American Blower Co., N. Y.
Westinghouse E. & Mfg. Co., New York
L. M. Prince & Co., New York
Hanson & Orth, New York
Canadian Westinghouse Co., London, Canada
J. T. Ryerson & Co., New York
Consolidated Gas Co., N. Y.
A. Schulte, N. Y.
Wm. M. Crane & Co., N. Y.
Narragansett Electric Co., Providence, R. I.

THE B. F. GOODRICH COMPANY

—Factories—

AKRON, OHIO

BRANCHES AND DISTRIBUTORS IN ALL DISTRICTS

PRODUCTS: Tubing, Hose (all kinds), Stoppers, Rubber Aprons and Hard Rubber Goods for use in Laboratories; Acid-proof Transmission Belts, Conveyor Belts, Packing and Valves for Chemical Manufacturing Plants; Gloves, Mats and Matting, Tiling, Tank Linings and Sheet Rubber furnished to Specifications.

TUBING:

For gas, air, water and acids.
Plain cloth insertion or cloth wrapped.
A grade for every requirement.

HOSE:

For water, steam, air, oil or gasoline.
A specially lined and covered hose for conducting acids in laboratory service.

HOSE:

For fire protection. Our special rubber-covered type is best. Protects the jacket from fumes and moisture.

STOPPERS:

Made of pure gum or semi-pure stock in all shapes and sizes with one or two holes as desired.

APRONS:

Made from special acid-resisting stock.

HARD RUBBER GOODS:

Pipe-fittings and other hard rubber laboratory supplies.

TRANSMISSION BELTS:

Specially protected from acid fumes and steam; rubber remains springy and grips the pulleys tight.

CONVEYOR BELTS:

For coke, coal, ore, chemicals and hot materials.
Trough without load.
Straight running—no guide idlers necessary.
Cushion cover protects the fabric.

PACKING

that stays packed.

For ammonia, steam, air, gas or oil—any pressure—any temperature.

VALVES:

For every purpose.
Specially compounded and hardened to fit all requirements.

GLOVES:

Hand made, acid resisting, with reinforced fingers and palms for severe service.

TANK LININGS:

Fine Para rubber specially cured for the lining of acid tanks.

SPECIAL SHEET RUBBER, DISCS AND GASKETS

furnished to your specifications.

MATS AND MATTING, AISLE STRIPS, TILING, ETC.:

The Goodrich Development and Research Departments have kept abreast of chemical requirements. Knowing conditions as they are and treating rubber specially to offset them is responsible for the universal and most satisfactory use of Goodrich Rubber specialties for chemists.

GERMAN-AMERICAN STONEWARE WORKS

Hudson Terminal Building
50 Church Street, NEW YORK

Works: KEASBEY, N. J.

TRADE MARK

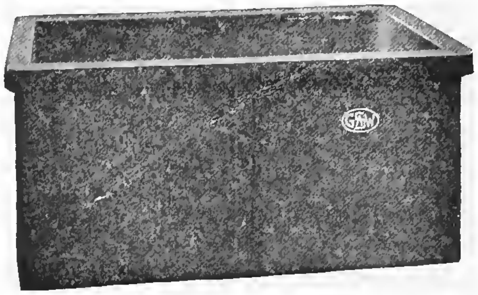
PRODUCTS: A complete line of Acid Proof Chemical Stoneware including Acid Elevators (Montejus)—automatic and non-automatic—Carboy Stoppers, Check Valves, Chlorine Generators, Cocks of all kinds, Coils, Crystallizing Vessels, Dampers, Decanting Pots, Dipping Baskets, Exhausters, Filters, Foot Valves, Funnels, Injectors, Jars, Kettles, Laboratory Sinks, Lanterns, Mariotte Bottles, Mortars, Nitrating Vessels, Percolators, Photographic Tanks, Pipes of all kinds, Pots, Pumps—Plunger and Centrifugal—Pumps for gases, Receivers, Retorts, Safety Valves, Stills, Stirrers, Storage Vessels, Subliming Dishes, Suction Filters, Siphons, Tanks, Tourills, Towers, Vacuum Kettles, Valves.

Complete plants for the manufacture and storage of acids.

Special apparatus made to drawings and specifications.

RECTANGULAR TANKS:

Made in capacities from 4 gallons up to 1,000 gallons and up to 11'0" long.



STORAGE VESSELS:

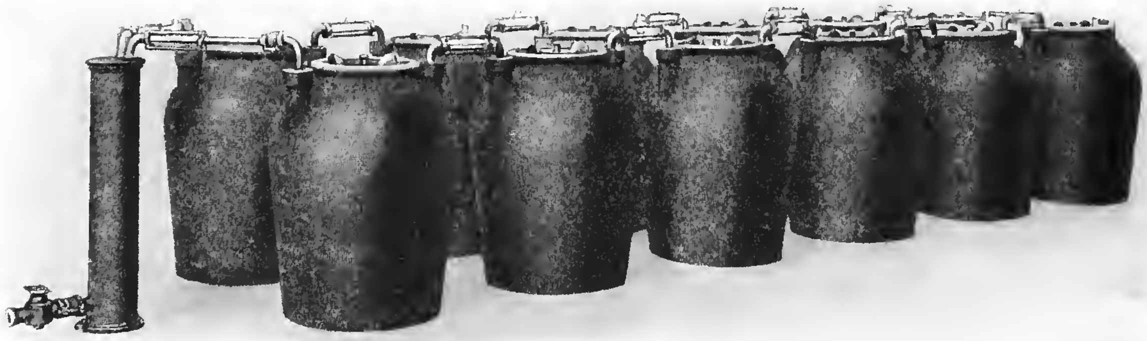
Capacities 130 gallons to 1050 gallons. Furnished with or without bottom outlet.

CYLINDRICAL VESSELS:

Capacities 14 gallons to 1125 gallons. Can be furnished with covers, and with or without bottom outlet.

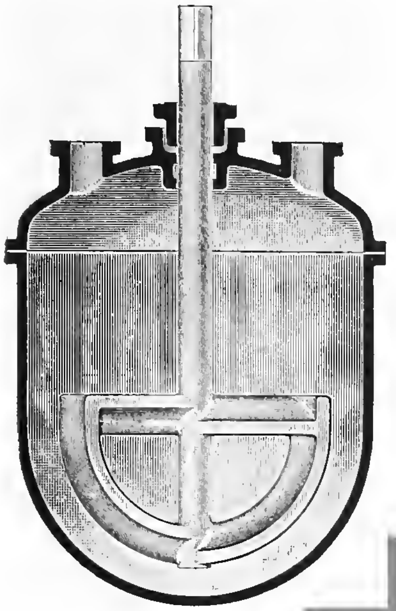
POTS:

Capacity of 6 gallons to 265 gallons. Can be furnished with covers, and with or without bottom outlet.



STORAGE VESSELS: Arranged in a battery, connected by siphons. As all joints are at the top of the vessels, leakage is impossible. Built of any desired capacity for all corrosive solutions.

STILLS AND KETTLES:

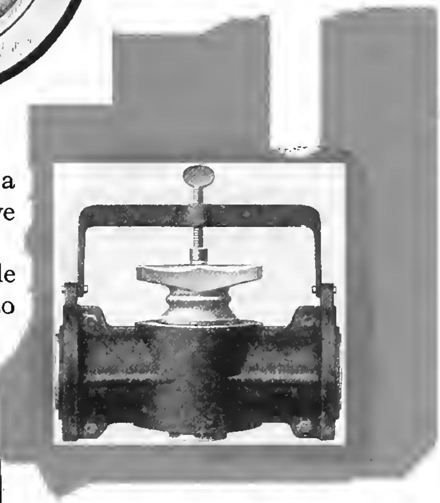


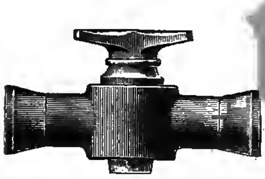
Made in all capacities up to 165 gals. Can be furnished complete with covers and stirrers as illustrated.

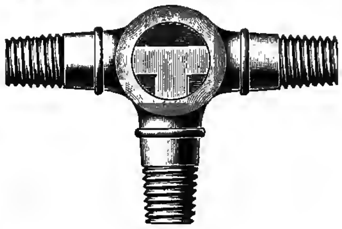
COCKS:

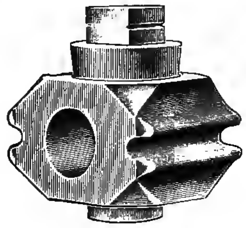
Below we illustrate a few of styles of cocks we manufacture.

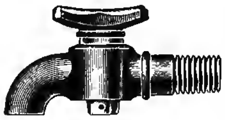
Sizes 3/8″ to 4″ inside dia. Larger sizes to order.

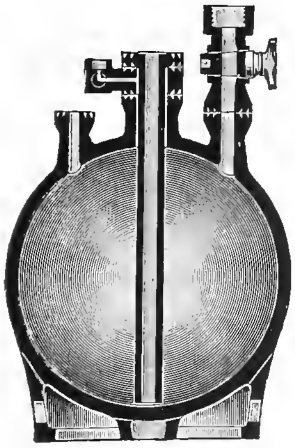










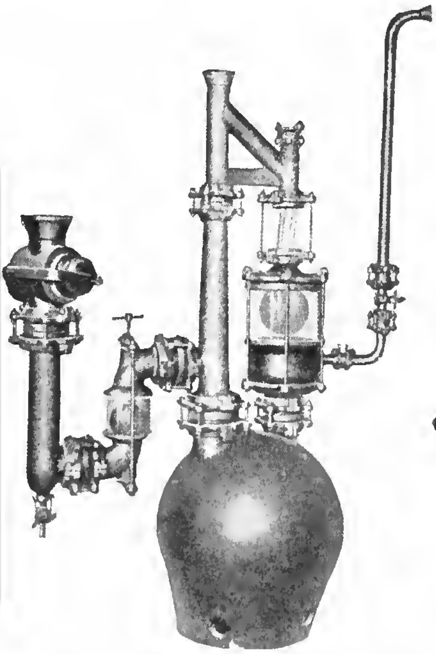


ACID ELEVATORS, NON-AUTOMATIC:

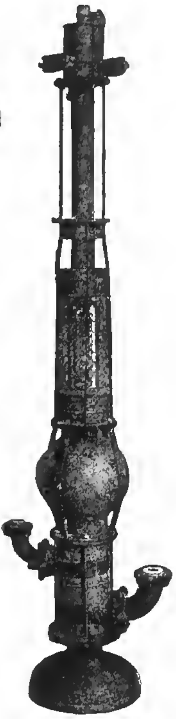
These acid elevators or Montejus or blow-cases, are furnished in capacities from 15 gallons to 525 gallons. They can be furnished, if desired, completely encased in a cast iron shell for use against heavy pressure.

AUTOMATIC ACID ELEVATORS:

The Plath automatic acid elevator is furnished in three sizes, having capacities of 530, 1060 and 1600 gallons per hour, respectively. The Securius pattern is made in two sizes having capacities of 260 and 530 gallons per hour, respectively. Either type is suitable for the raising of any corrosive solution and requires no attention beyond a constant supply of compressed air.



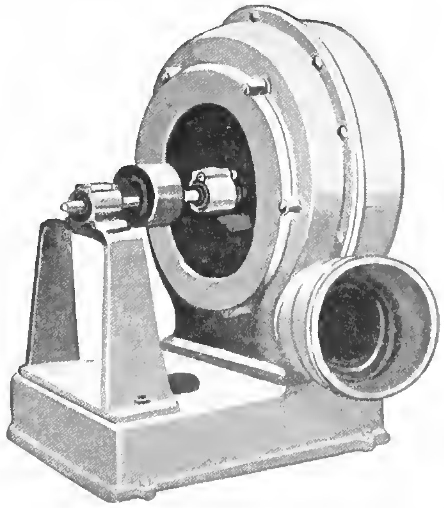
PLATH AUTOMATIC ACID ELEVATOR



SECURIUS AUTOMATIC ACID ELEVATOR

EXHAUSTERS:

For acid gases, made in four sizes for 4″, 6″, 8″ and 12″ gas connections; so designed that chemical stoneware alone comes in contact with the gas. These machines are encased in an iron shell.



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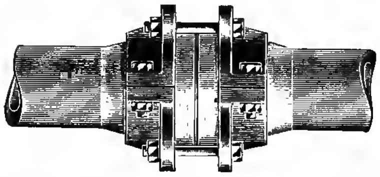
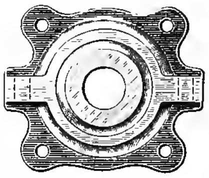
PIPES:

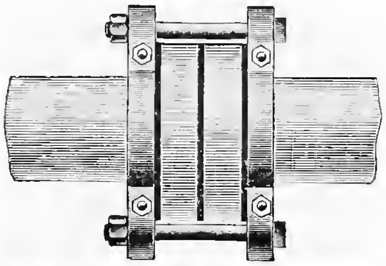
Flanged pipe can be furnished in all diameters up to 6″. Larger pipes to special order.

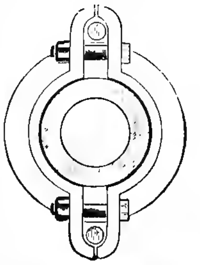
Socket pipe can be furnished in any diameter up to 48″.

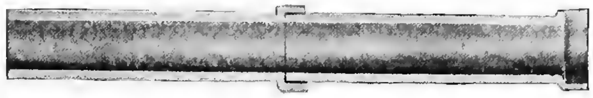
All styles of pipe can be furnished complete with elbows, tees, Y's, cocks and other fittings.



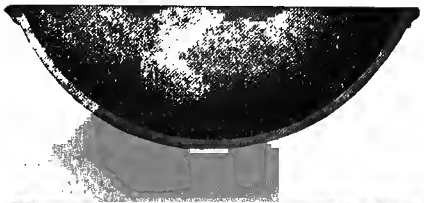








EVAPORATING DISHES



Shallow:

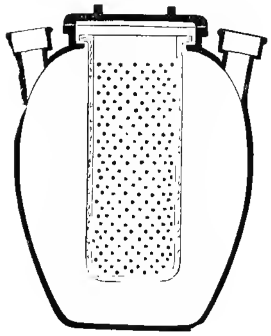
Capacities from 1¼ gal. up to 42 gal.

Hemispherical:

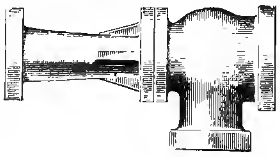
Capacities 8½ gal. up to 120 gal.

CHLORINE GENERATORS:

Can also be used for hydrogen sulphide—capacities 13 gal. to 130 gal.



INJECTORS:



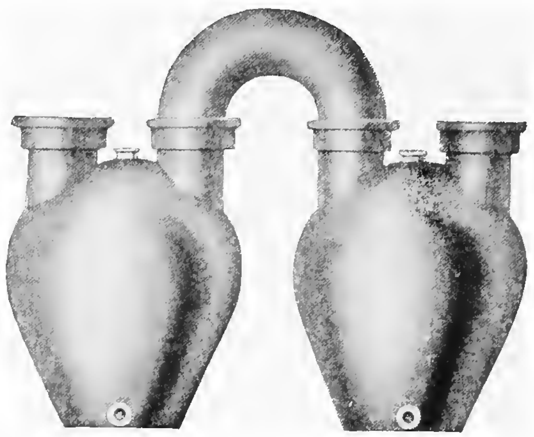
For moving liquids by means of steam, or gases by means of steam or compressed air.

TOURILLS (RECEIVERS) FOR CONDENSATION OF NITRIC ACID:

6 gal. to 150 gal. capacity.

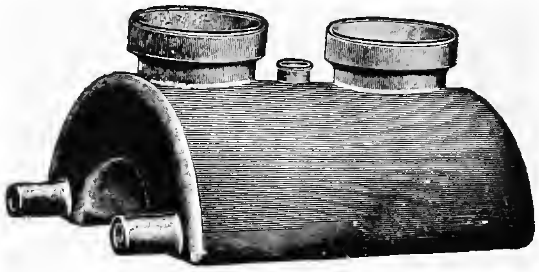
Also to special design for condensation under vacuum.

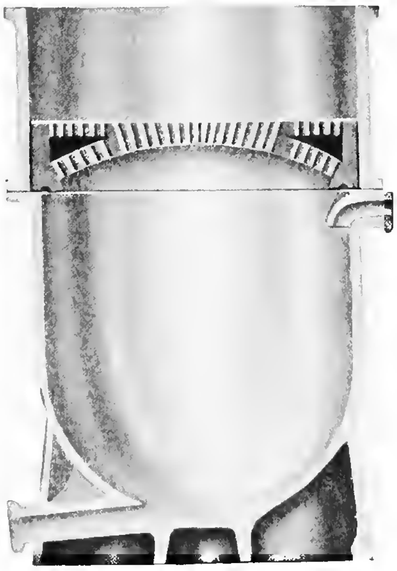
These vessels can be furnished with dip pipe to serve as Woulff's bottles, and with siphon tubes for the manufacture of muriatic acid.



CELLARIUS TOURILLS:

Made in three sizes for 6″, 8″ and 12″ gas connections for muriatic acid.





SUCTION FILTERS:

Made in a variety of sizes from ½ gal. for laboratory purposes, to 105 gal. for industrial purposes. In the larger sizes the sieve plates are arched on the under-side and will safely resist the pressure due to a complete vacuum.

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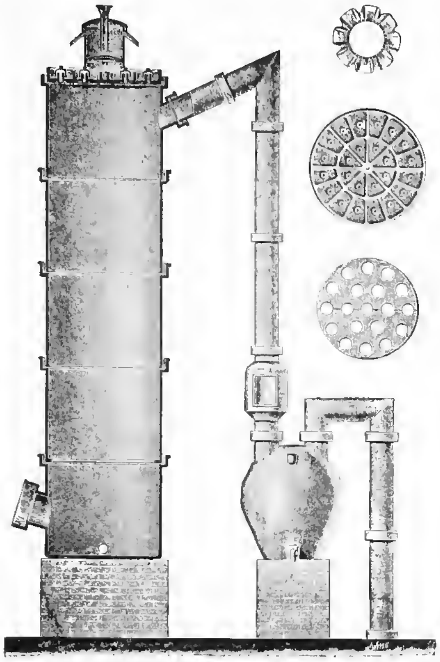
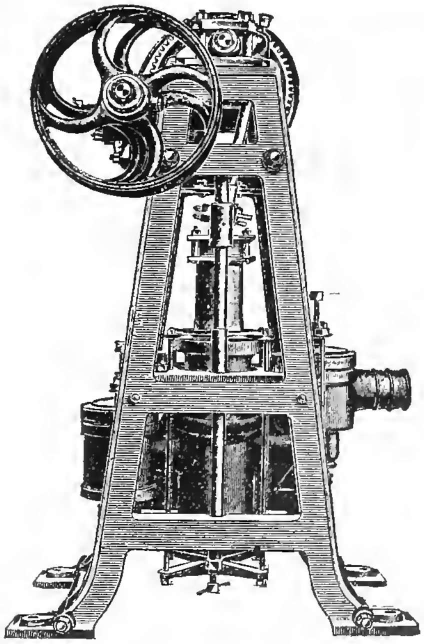
TOWERS:

For the absorption and condensation of gases, in connection with the manufacture of muriatic, nitric, sulphurous acids, etc., nitric acid recovery plants, gas drying plants and installations for handling waste gases.



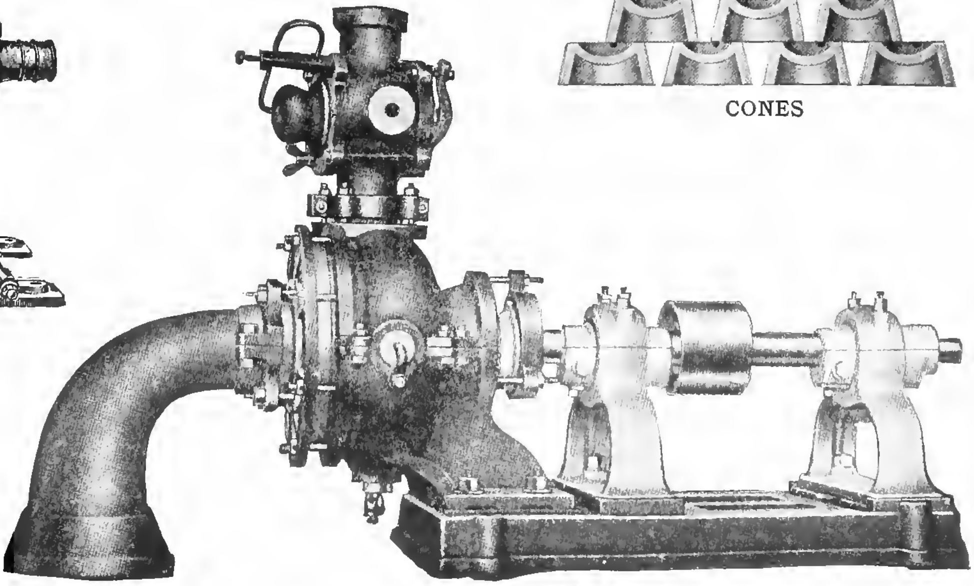
TOWER INSTALLATION



PUMPS:

Plunger pumps are furnished in capacities from 7 gal. per minute to 85 gal. per minute.

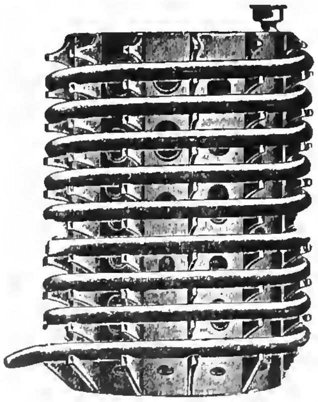
Centrifugal pumps are made in two sizes in capacities up to 350 gal. per minute.



COILS:

Made in a large variety of sizes from $\frac{3}{8}$″ to 3″ bore and 17′0″ to 90′0″ length of tube.

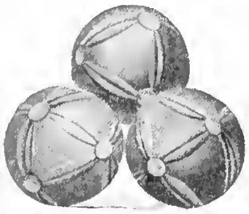
For condensation of nitric acid and distillation and rectification or organic acids under vacuum or normal pressure. Also made with raised outlet for heating and cooling liquids.



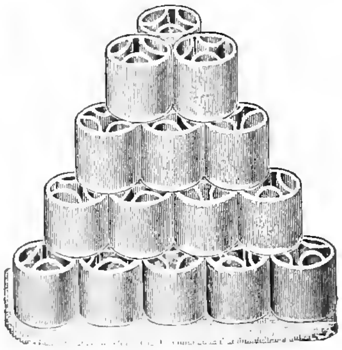
TOWER PACKERS:

Furnished in a wide variety of sizes and styles.

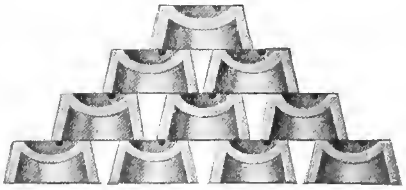
We also furnish special towers including the Kypke Star Plate Tower and the well-known Lunge-Rohrmann Plate Tower which has the advantage of extreme efficiency.



PERFORATED BALLS



PARTITION PIPES



CONES

THE GUERNSEY EARTHENWARE CO.

CAMBRIDGE, OHIO, U. S. A.

Specify Through Your Dealer

ROYAL GUERNSEY LABORATORY PORCELAIN

FIRST MADE-IN-AMERICA

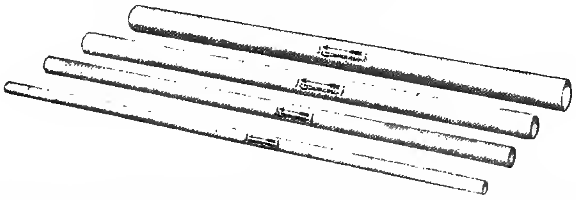
PRODUCTS: Chemical Porcelainware, including Beakers; Combustion Boats; Combustion Tubes; Crucibles; Evaporating Dishes; Dye Pots; Plates; Rose Crucibles; Spatulas; Spoons; Retorts; Buchner and Hirsch Funnels; Etc.

All shapes and sizes same as Royal Berlin Porcelainware.

We use Recording Pyrometers in all Kilns, and know that all ware is evenly vitrified throughout.

We have passed the experimental stage. Our lines are the most complete. OUR SECOND CATALOG —compact, complete, attractive—is just out. Send for the copy that's waiting for you.

5010—COMBUSTION TUBES



Glazed inside and outside. Will stand a temperature of 1800 degrees Fahrenheit, and are practically gas tight. In 24-inch lengths.

Size Number	1	2	3	4	5	6
Diameter of Bore	⅜″	⅝″	¾″	1″	1⅛″	1¼″
Each	$1.80	2.20	2.50	3.00	3.60	4.20

5011—TUBES

Either Glazed or Vitrified.

Number	1	2	3
Inside Diameter mm	32	58	83
Outside Diameter mm	45	70	90
Length mm	1250	1200	1200
Each	$9.00	12.00	15.00

5009—TUBES

Glazed Inside and Outside

Number	1	2
Inside Diameter mm	11	11
Outside Diameter mm	13	17
Length mm	500	460
Each	$2.50	3.20

We are equipped to make special sizes in PORCELAIN TUBES to order, up to 8 inches Inside Bore.

4002—PLATES

Glazed, for Color Reaction

Number	1
With 12 Cavities	Size 110 x 90 mm
Each	$0.75

1701—COMBUSTION BOATS

Glazed

Number	1	2	4	5	6	7
Length mm	60	75	75	100	115	145
Width mm	10	11	15	18	13	14
Each	$0.16	18	.18	.24	.36	.50

COMBUSTION BOATS

Unglazed, Vitreous

Number	1	2	4	5	6	7
Length mm	60	75	75	100	115	145
Width mm	10	11	15	18	13	14
Each	$0.10	.12	12	.18	.24	.36

1102—EVAPORATING DISHES

Royal Guernsey Porcelain, with Lip. No. 000-4 are entirely glazed; larger sizes are glazed inside, but only partly outside. Medium deep form.

Size No	000	00	0	1	2	3	4	5
Cap. about cc	35	50	80	100	140	175	210	300
Height about mm	24	27	30	33	37	42	43	50
Diameter about mm	60	70	80	85	90	100	110	120
Each	$0.12	.15	.20	.25	.35	.40	.45	.55

Size No	5a	6	6a	7	8	9	10
Cap. about cc	330	385	535	765	1285	2200	3250
Height about mm	48	48	50	54	63	80	95
Dia. about mm	125	145	155	185	215	265	305
Each	$0.60	70	.80	.90	1.20	1.75	2.75

Size No	11	12	12a	13	14	15
Capacity cc	5700	10000	11360	16500	22800	32000
Height about mm	116	140	140	175	180	200
Diam. about mm	360	400	450	460	560	620
Each	$3.65	8.50	12.00	18.00	25.00	32.00

1101—EVAPORATING DISHES

Royal Guernsey Porcelain, with Lip. Are entirely glazed. Shallow form.

Size No	0	1	2	3	4	5	6	7
Capacity cc	20	45	60	95	160	200	350	550
Height mm	12	15	20	23	30	34	40	48
Diameter mm	60	70	80	95	105	130	140	160
Each	$0 12	.15	.20	.30	.40	.50	.70	.90

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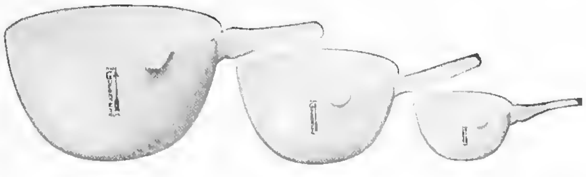
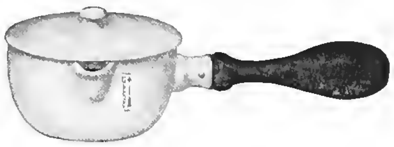
1401—CASSEROLES



Royal Guernsey Porcelain, with Porcelain Handles. Glazed Inside and Outside.

Size No.	1	2	2a	3	3a	4	5	6	7
Capacity cc.	30	75	115	150	210	375	750	1250	2000
Height about mm.	25	35	41	45	50	62	80	95	130
Dia. over body mm.	50	70	80	95	95	110	135	165	175
Each	$0.35	.40	.46	.50	.70	.90	1.40	2.00	3.59

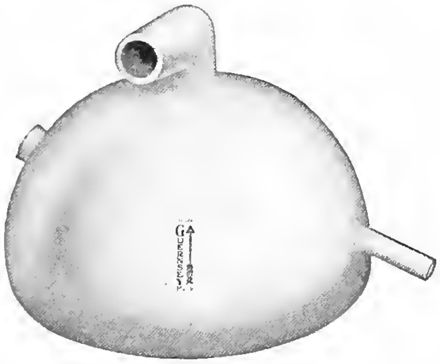
1402—CASSEROLES



With Cover and Wood Handles. Glazed Inside and Outside

Size No.	00	0	1	2	3	4
Capacity cc.	125	250	375	500	720	1000
Diameter about mm.	90	105	110	120	152	172
Each	$0.45	.50	.70	.90	1.40	1.60

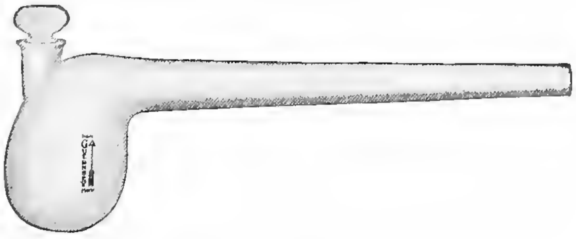
6001—RETORTS



Glazed Inside and Outside

Number	1
Capacity cc.	3300
Each	$6.80

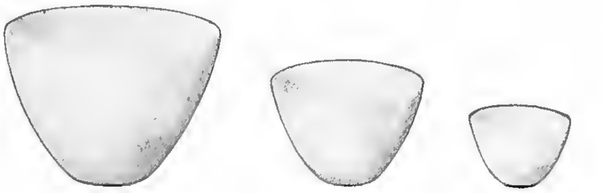
6002—RETORTS



Vitrified, with Tubulature and Stopper

Number	1	2	3
Capacity cc.	140	210	275
Each	$2.50	4.00	4.35

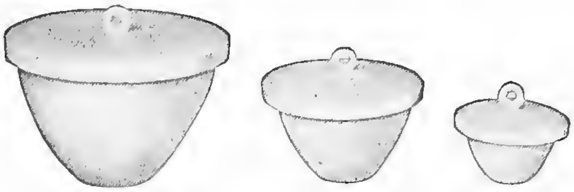
1201—CRUCIBLES



Royal Guernsey Porcelain. Wide Form, without Covers. Glazed Inside and Outside

Size No.	00000	0000	000	00	0	1	2	3	4	5
Cap. about cc.	.05	2	8	12	17	26	50	80	145	265
Height about mm.	9	12	19	21	25	29	36	44	52	65
Diameter about mm	14	18	32	37	41	46	56	67	81	96
Each	$0.08	.08	.08	.10	.14	.18	.23	.30	.35	.40
1203 covers only, ea.	$0.04	.06	.07	.08	.12	.14	.14	.18	.20	.24

1202—CRUCIBLES



Royal Guernsey Porcelain. Wide Form, with Covers. Glazed Inside and Outside

Size No.	00000	0000	000	00	0	1	2	3	4	5
Cap. about cc.	.05	2	8	12	17	26	50	80	145	265
Height about mm.	9	12	19	21	25	29	36	44	52	65
Diameter about mm	14	18	32	37	41	46	56	67	81	96
Each	$0.12	.14	.15	.18	.26	.32	.37	.48	.55	.64

Special shapes made to order, to meet your particular requirements.

RESULTS OF TESTS:

Prof. D. J. Demarest, The Ohio State University, Department of Clay-working and Ceramics:

"Upon using the Casseroles in the same way that a Casserole is used for the determination of Silica in Clay, involving two evaporations of hydrochloric acid solution to dryness, the Casseroles each lost 0.0005 gram, which is equal to the best Porcelain. The Casseroles withstood the same shock as similar German Porcelain. I find that the Guernsey Casseroles lose no more weight, that is, are no more soluble, than Royal Berlin Porcelain Casseroles."

The Leeds & Northrup Company, Electrical Measuring Instruments, Philadelphia:

"Since writing our letter in reference to Pyrometer Tubes, we would say that we have made a high-temperature test of one of your Tubes at about 1800 degrees Fahrenheit for several days."

Prices: All goods are priced by one (1) item: each. Prices are subject to change without notice.

Deliveries: All goods are sold free on board cars at our plant, at shipping point, subject to the usual package charges.

Shipment: When Transportation Company has receipted to us for shipment in good order as per signed B. L., our responsibility ceases, and in case of loss or damage, your claim must be made against the Transportation Company.

Packing: Our packers are skilled, experienced men and our goods are packed in a careful manner; however, we do not guarantee delivery against breakage.

Sizes and Capacities: Sizes and capacities shown in this list are fluid measurement. We aim to keep them accurate, but do not guarantee same.

THE GRASSELLI CHEMICAL COMPANY

Main Office and Principal Works

CLEVELAND, OHIO

Address The Grasselli Chemical Co. at the nearest office.

New York, N. Y.
80 Maiden Lane
Philadelphia, Pa.
Boston, Mass.

Chicago, Ill.
Milwaukee, Wis.
Detroit, Mich.
St. Paul, Minn.

Cincinnati, O.
St. Louis, Mo.
Birmingham, Ala.
Pittsburgh, Pa.

New Orleans, La.
Toronto, Ont.
Hamilton, Ont.
Montreal, P. Q.

PRODUCTS:

COMMERCIAL ACIDS:

Acetic Acid
"Mixed" Acid (Nitric and Sulphuric)
Muriatic Acid
Nitric Acid
Nitric Acid "Fuming"
Aqua Fortis
Electrolyte (Storage Battery Acid), all strengths
Sulphuric Acid
Oil of Vitriol
Oleum

ALUM:

Alum
Filter Alum
Paper Makers' Alum

AMMONIA:

Anhydrous Ammonia
Aqua Ammonia, all strengths
Sal Ammoniac (Muriate of Ammonia)

COPPER:

Sulphate of Copper (Blue Vitriol)
Coppers, Battery

LEAD:

Acetate of Lead (Sugar of Lead), all grades

SODIUM:

Acetate of Soda
Anhydrous Sodium Chloride
Bicarbonate of Soda
Bichromate of Soda
Bisulphate of Soda
Bisulphite of Soda (for Bleaching)
Calcined Salt Cake
Carbonate of Soda
Carbonating Soda (for Bottlers)
Caustic Soda, Solid and Ground
Sodium Cyanide Mixture
Glauber's Salt
Hyposulphite of Soda
Nitrate of Soda
Phosphate of Soda
Sal Soda
Silicate of Soda
Sulphate of Soda
Sulphide of Sodium
Sulphite of Soda
Soda Ash
Tri-Sodium Phosphate for softening water. Removes scale and prevents incrustation in boilers

SPELTER (ZINC):

"High Grade," "Brass Special," "Prime Western." Special qualities and sizes of ingots for brass and electrical uses and galvanizing. Granulated Spelter, Battery Zincs, Anodes, Zinc for Electro-Galvanizing, Zinc for Sherardizing and Zinc Dust.

STRICTLY CHEMICALLY PURE:

Sulphuric Acid, Hydrochloric Acid, Nitric Acid and Aqua Ammonia. Analysis on label in each case.

SOLDERING AND TINNING FLUXES:

Eureka Soldering Flux, Standard Soldering Flux, Snow Flake Soldering Salt for Electrical Work, Grasselli's Tinning Flux, Salamac (an improved lump Sal Ammoniac for cleaning soldering irons).

ZINC:

Chloride of Zinc, for wood preserving, electrical and other purposes
Sulphate of Zinc
Metallic Zinc—see Spelter

MISCELLANEOUS:

Acid Phosphate and complete Fertilizers
Barium Chloride
Bichromate of Potash
Bichloride of Tin (Stannic Chloride)
Cadmium, metallic, in sticks and anodes
Cadmium, Sulphate and Sulphide
Calcium Chloride
Cyanide Chloride Mixture
Chloride of Lime (bleaching powder)
Epsom Salts (Magnesium Sulphate) Tech. and U. S. P.
Glycerine
Grasselli's Depilatory
Grasselli's Metal Pickle
Grasselli's Rubber Makers' White
Grasselli White (Lithopone), a pigment for paint
Jellicate (Silicate of Soda). For paper makers
Liquid Glue. Purity Lye. Pumice Stone
Silex, Pulverized, for scouring soaps, etc.
Sulphate of Alumina (for water filtration)
Sulphate of Alumina (Iron Free) and commercial
Sulphate of Barium (Blanc Fixe)
Sulphate of Iron (Copperas)
Sulphur (Brimstone) Roll, Crude, Flour and Flowers
Tin Crystals (Chloride of Tin, Stannous Chloride)
Titanium Oxalate

THE HAUSER-STANDER TANK CO.

CINCINNATI, OHIO

PRODUCTS: Tanks, Cypress, Yellow Pine, Fir or Redwood; Lead Lined or Plain; Any Shape or Size.

ACID AND PICKLING TANKS:

These tanks are constructed from thoroughly seasoned material of Louisiana Red Cypress, Long Leaf Yellow Pine, Oregon Fir or Redwood as specified. All braces are of hardwood with hardwood rims around the top, in which the nuts of vertical bolts are countersunk, the holes being plugged up tight with wood plugs so that contents of the tank cannot come in contact with the metal. Malleable washers are used where nuts come in contact with the body of the tank. Truss rods as per illustration are used in tanks over 72 inches long. All iron rods fitted with cold pressed hexagon nuts. Rods of brass, copper, galvanized or lead covered material supplied if specified. Where lead lining is used the lead is burnt into the tank making a solid lead basin impervious to acids. These tanks are adapted for use with hot oils, paints, glaze, acids, dyes, soaps, inks, metallurgical mill solutions, etc. The lumber is thoroughly air-seasoned in the company's yards and labor trained to make each tank mechanically correct. The pressure of the various sized tanks is correctly determined by engineers, and with the rodding and bracing, "Hauser-Stander" tanks, are guaranteed against bulging or leaking.

SIZES:

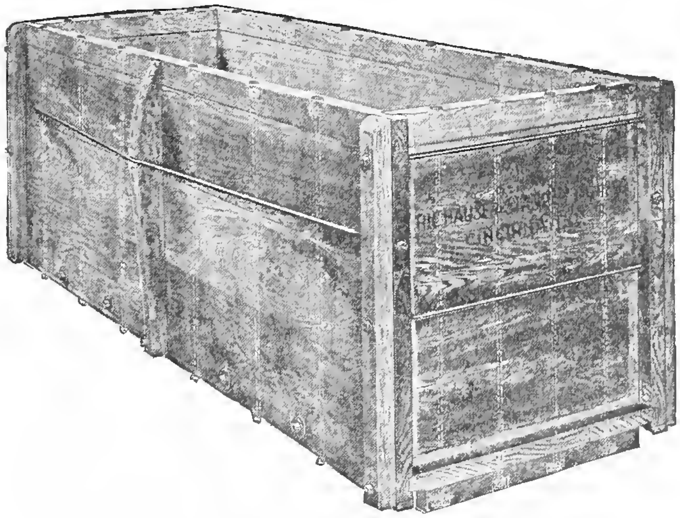
These tanks can be supplied in any shape, size or capacity desired, of genuine Louisiana Red Gulf Cypress, Yellow Poplar, Southern Long Leaf Yellow Pine, Quartered or Plain White Oak, Northern White Pine, Oregon Fir or California Redwood.

SPECIAL TANKS FOR CHEMICAL INDUSTRIES:

Plain or lead lined tanks of any shape or size can be supplied to chemical manufacturers, acid manufacturers, film manufacturers, dye and color works, photographers, electrotypers, galvanizers, textile mills, foundries, metallurgical mills, tanneries, etc.

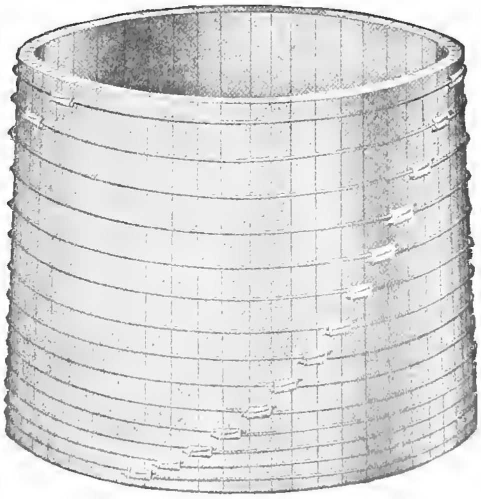
PERMANENCE:

On the top of the John Shillito Co. building in Cincinnati is one of the many tanks for water purposes which we have erected. This tank has a capacity of 15,000 gallons and cost $220, and has been in use for twenty-six years at a cost of $8.46 per year, or a little less than 2⅓ cents per day. This tank is made of Louisiana Red Cypress, is in good condition and good for many more years. For water tanks we recommend Louisiana Red Cypress. For some purposes cheaper lumber can be used, such as Oregon Fir or Yellow Pine.



HAUSER-STANDER ACID AND PICKLING TANK

No metal exposed to tank contents



STANDARD TYPE HAUSER-STANDER ROUND TANK

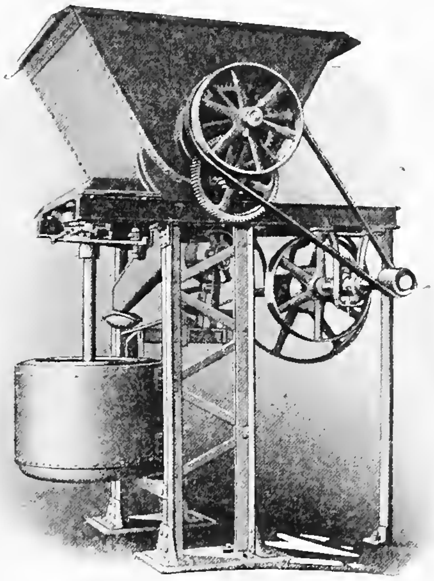
Hooped to meet your requirements

S. S. HEPWORTH COMPANY

92 William St. NEW YORK CITY, N. Y.

Factory: NEW YORK CITY, N. Y.

PRODUCTS: Mackintosh Centrifugal Machines with Mixers to feed them, Unloaders to discharge the dried material from them, and Conveyors and Elevators to take it away.



30-INCH MACKINTOSH CENTRIFUGAL

With mixer for feeding it and mechanism for driving it, all mounted on steel frames

Mackintosh Centrifugals are self-balancing, hanging machines of the Weston type, but with the distinguishing characteristic that they are self-steadying as well as self-balancing. They *can* swing, but they do *not* swing, although they have no elastic cushions of perishable rubber or other material, and no bearing below the basket.

Basket.—Usually of iron and steel, with discharge opening in the bottom and saw-steel valve for closing it.

TABLE OF SIZES

Size	Top Opening	Capacity
30″ x 18″	20″	4 cu. ft.
36″ x 21⅝″	25″	6½ cu. ft.
40″ x 24″	28″	9 cu. ft.

Bearing.—Of the ball-type, dipping into an oil-retaining chamber, at the upper end of the spindle of the machine, and removable without moving the machine.

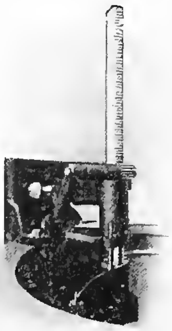
Brake.—Of flexible band type, with non-burn lining. Imposes no pressure on the ball-bearing, is adjustable without the aid of tools, and is removable without moving the machine.

Brake Drum.—Air-cooled, by means of fan-like arms, and so located that the belt driving the machine does not receive heat from it and become dry and hard.

Friction Pulley.—For driving the machine. Has bands like the brake. Turning a single screw, while the driving shaft is either at rest or in motion, adjusts it to reach full speed as quickly or as slowly as may best suit the material being dried.

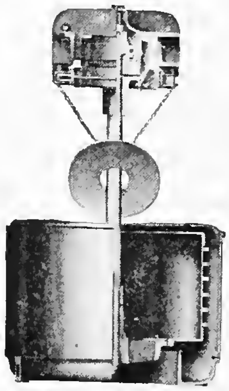
Guide Pulley.—For guiding the driving belt from the friction pulley to the centrifugal machine. Supported by a bearing at each side, and moved automatically to take up the stretch of the belt and keep it always tight—a thing that it is practicable to accomplish only by automatic means.

Lubrication.—All bearings lubricated with ordinary mineral machine oil, and all arranged to retain it without waste.



UNLOADER

For discharging the dried material from centrifugal machines



MACKINTOSH CENTRIFUGAL

Showing saw-steel valve lifted from discharge opening, in the basket bottom, and hanging above the latter

For Full Particulars, ask for Bulletin C.

HERMAN & HERMAN, INC.

Manufacturers and Jobbers of Chemicals

6 Church Street

NEW YORK

Long Distance Phone: New York 167

Phone: Cortland 1078-79

PRODUCTS:

Chemicals, Colors and Intermediates for the Textile and Photographic Trades and Chemical Manufacturers, including among others—

ACIDS:

- Sulphuric
  - All Grades

- Oleum
- Nitric
- Muriatic (Hydrochloric)
- Acetic
- Oxalic
- Gallic
- Pyrogallic
- Salicylic and Derivatives
- Carbolic

INTERMEDIATES:

- Alphanaphthylamine
- Aniline Salt
- Aniline Oil
- "Aniline for Red"
- Dinitrophenol
- Beta-Naphthol
- Dimethylaniline
- Paranitraniline
- Paraphenylenediamine
- Dinitronaphthalene
- Diamidophenol
- Mixed para and ortho Toluidine
- Dinitrochlorbenzol
- Chlorbenzol
- Nitrobenzol
- Dinitrobenzol
- Benzaldehyde
- Benzylic Alcohol
- Para-amidophenol

ANTHRACINE

BENZOL

All Grades

TOLUOL

All Grades

XYLOL

PHENOL (CARBOLIC ACID)

All Qualities and Grades

LOGWOOD EXTRACT

Liquid and Paste

HEMATINE CRYSTALS

NIGROSINE

Water and Spirit Soluble

DYESTUFFS

- Sulphur Black
- Sulphur Brown
- Hydrolene Grey
- Acid Yellow
- Azo Yellow
- Azo Carmine
- Indigo Substitute
- Methylene Blue
- Crystal Violet B
- Crystal Violet 6 B
- Malachite Green
- Orange H H
- Basic Green
- Nigrosine
- Renard X X
  - (Blue Fur Dye)

NAPHTHALENE FLAKES

American and English

CAUSTIC SODA

SODA ASH

CHLORATE OF SODA

CHLORATE OF POTASH

BICHROMATE OF SODA

BICHROMATE OF POTASH

YELLOW PRUSSIATE OF SODA

RED PRUSSIATE OF SODA

PHOTOGRAPHIC CHEMICALS, ESPECIALLY DIAMIDOPHENOL "AMIDOL" and "PAROL"

WRITE US REGARDING RAW MATERIALS.

Raw Materials of all kinds supplied for Chemical Industries and Contracts entered into for the Disposal of the Finished Products.

We manufacture a large line of chemicals and can secure almost any others.

THE HEYDEN CHEMICAL WORKS

Factory:
Garfield,
N. J.

New York Office: 135 William St.
Chicago Office: 180 N. Market St.

PRODUCTS:

Acid Benzoic ex toluol

Acid Salicylic, synthetic

Acid Salicylic, from natural oil

Argentum Nucleinicum

Argentum Proteinicum

Bromides:
- Sodium Bromide
- Ammonium Bromide
- Potassium Bromide
- Strontium Bromide

Cresotinic Acid

Formaldehyde

Paraformaldehyde (trioxymethylene)

Guaiacol Liquid

Guaiacol Crystals

Hexamethylene Tetramine

Ichthynat

Manganese Dioxide Recovered

Magnesite Calcined

Methyl Salicylate, U. S. P. (Oil Wintergreen, Synthetic)

Potassium Creosote Sulphonate

Potassium Guaiacol Sulphonate

Potassium Permanganate

Salol

Sodium Benzoate

Salicylates:
- Sodium Salicylate
- Strontium Salicylate
- Magnesium Salicylate

Pharmaceutical Specialties

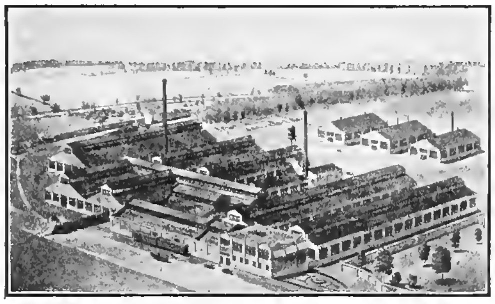
HOOPER-FALKENAU ENGINEERING CO.

Industrial Engineers and Architects

WOOLWORTH BUILDING
NEW YORK

SERVICES:

The design and supervision of erection of industrial plants, special machinery and equipment, systematizing of business organizations and shop management.



NELSON VALVE CO., PHILADELPHIA

DESIGN OF PLANTS:

We are not chemical engineers, but co-operate with chemical engineers in designing and supervising the erection of large plants for carrying out chemical processes on a large scale.

We make general and detailed plans and specifications for complete buildings and equipment for manufacturing plants.

CO-OPERATION:

We suggest the advisability of consultation between chemical engineers and ourselves, at the inception of the design of plant. This insures designs which readily lend themselves to future expansion.

HEATING, COOLING AND VENTILATING SYSTEMS:

We design and supervise the installation of complete heating, cooling or ventilating systems adapted to the specific needs of the various chemical industries.

WATER-SUPPLY SYSTEMS:

We undertake the design and supervision of installation of water supply and distribution systems of all kinds.

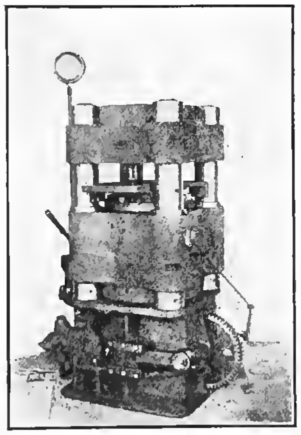
We are prepared to co-operate with chemical engineers in furnishing adequate water supply for chemical operations.

CONVEYING MACHINERY:

In all large chemical plants it is necessary to convey large quantities of materials from one part of the plant to another. The materials may be of different consistency or temperature, and therefore require specially adapted conveying machinery. We have designed a number of successful installations which provided for peculiar and difficult requirements.

POWER PLANT INSTALLATIONS:

We design and supervise the installation of complete power plants adapted to the peculiar needs of any of the chemical industries. Our service includes a general design of power generating and transmission systems, including the purchase and supervision of installation of all equipment. We also remodel systems for the generation, transmission and distribution of power.



HYDRAULIC PRESS FOR JOHN WYETH & BRO.

SPECIAL MACHINERY:

We undertake the design of machinery and hydraulic presses for special purposes.

OTHER SERVICES:

We make investigations and reports in the selection of plant sites, on the relative cost of raw material, shipping facilities, cost of operation, labor markets, etc.

We also make appraisals.

SOME OF OUR CLIENTS:

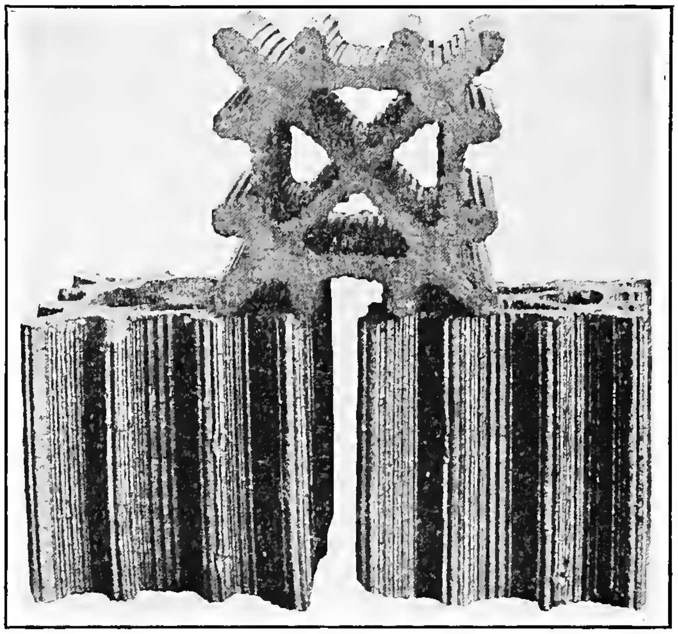
Babcock & Wilcox Co
Crane Co.
Didier March Co.
Farrel Found. & Mach. Co.
Harrison Bros. & Co.
Hooker Electro Chem. Co.
H. K. Mulford Co.
Otis Elevator Co.
Watson Stillman Co.
Welsbach Co.

B. MIFFLIN HOOD BRICK COMPANY

Manufacturers of Acid-Proof Brick, Tower Packing and Chemical Stoneware

Candler Building, ATLANTA, GA.

PRODUCTS: Acid-proof Brick, Chemical Tile, Rings, Blocks, Tower Packing, Grillage and Stoneware. Special Brick and Tile adapted for Acid-proof Cement Masonry.



The "Pottry" Heckenbleickner hollow block is corrugated and fluted on internal as well as external surfaces and has the greatest amount of condensation surfaces of any acid-proof unit on the market.

FACILITIES:

Shipments made as far as Manila, Philippine Islands. "Quality, speed and service"—our motto. During the past two years' rush not a single factory delayed for our material. Telegraph us collect your requirements, we will quote promptly and make quick shipments. Large stocks carried on hand.

RECENT INSTALLATIONS:

Over 400 car loads of Hood's "Pottry" acid-proof Chemical wares have, on account of their superiority and quick services, been furnished to the following concerns:

General Chemical Co.
American Synthetic Dyes, Inc.
Keystone Reduction Co.
Commonwealth Acid Phosphate Co.
Aluminum Company of America.
Carnegie Steel Co.
Savannah Guano Co.
United Gas Improvement Co.
Alabama Chemical Co.
International Agricultural Corporation.
Caraleigh Fertilizer Works.
E. O. Painter Fertilizer Works.
Southern Fertilizer & Chemical Co.
Butterworth-Judson Co. (Three Plants).
American Agricultural Chemical Co.
Victor Chemical Co.
American Cyanamid Co.
Southern Electro Chemical Co., Nitrolee, S. C.
Tennessee Chemical Co.
Piedmont Electro Chemical Co.
Tennessee Copper Co.
Detroit Chemical Co.
Standard Guano Co. (Two Plants).
F. S. Royster Guano Co. (Three Plants).
E. I. du Pont de Nemours Co. (Four Plants).
Virginia-Carolina Chemical Co. (Seven Plants).
Armour Fertilizer Works (Four Plants).
Swift Fertilizer Works (Three Plants).
Baugh Chemical Co.
Smith Agricultural Chemical Co.
Ammo-Phos Corporation.
Ducktown Sulphur, Copper and Iron Co., Ltd.

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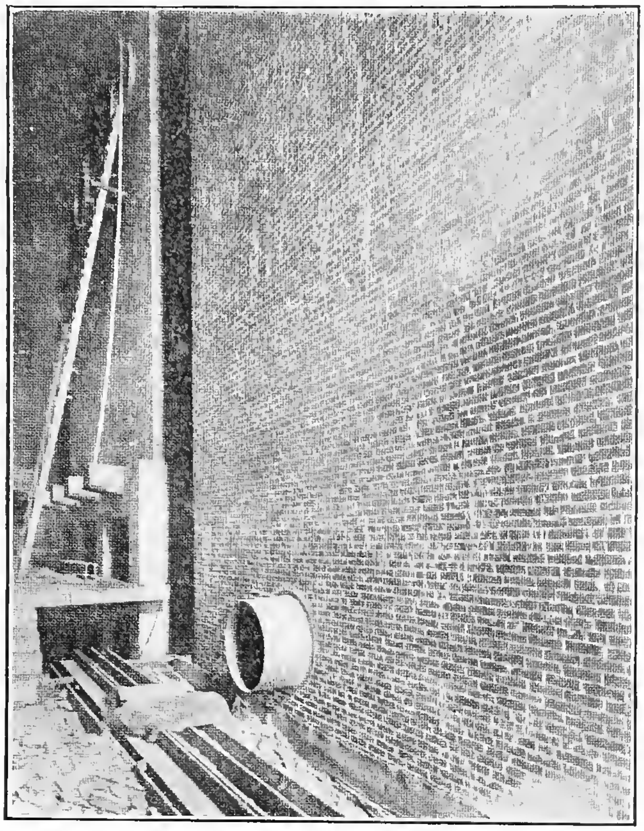
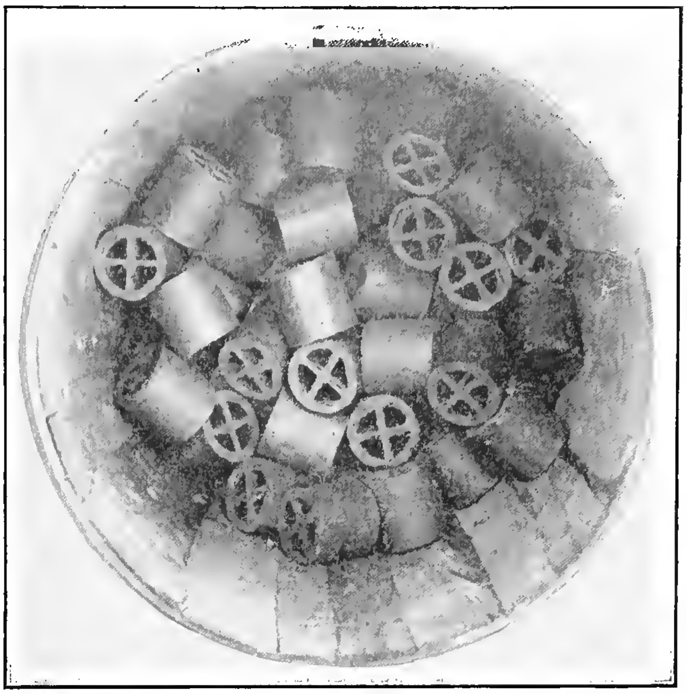


ACID-PROOF BRICK TOWER CONSTRUCTION
Chemical Construction Co., Charlotte, N. C., Contractors; Peter S. Gilchrist, Engineer

HOOD'S "POTTRY" ACID-PROOF CHEMICAL WARE:

Wonderful progress was made in the chemical industry in 1915–16. Burnt clay ware is keeping pace with this progress. Packing for Gay Lussac Towers now have five times as much condensation surface as standard brick which were formerly used.

The raw material is the highest grade slate shale mixed with pulverized old scrap whisky jugs and crockery—the waste pile of pottery plants. This grog gives a backbone, acting like steel in the reinforcing of concrete, thus enabling us to burn at very high temperatures, insuring a glassy vitrification and at the same time true shape.



THREE INCH ACID RINGS FOR TOWER PACKING

For concentrators, large quantities of our acid-proof bricks and tiles have been furnished the Chemical Construction Co., of Charlotte, N. C., and successfully used with their acid-proof cement in numerous plants including those for du Pont Powder Co., and the International Agricultural Corporation.

Beware of glazed chemical ware as it is a veneer that can cover a multitude of defects. Insist on your wares being vitrified through and through and glazes left off so the material can be inspected in mass without chipping each piece. On the surface, glazed underburnt chemical ware looks as good as glazed thoroughly vitrified wares.

PACKING FOR GAY-LUSSAC TOWERS:

Before selecting your packing for Gay Lussac Towers, please study the following table, since ideal condensation surface is so much desired. In one cubic foot of space, there are approximately the following number of square feet of surface:

In one cubic foot of tower space there are approximately the following number of square feet of condensation surface:

		Free Air Space	
Paving Brick Checkered	7½ sq. ft.	50 per cent	
Standard Brick Checkered	10 " "	50 " "	
8 x 4 x 1½ "Pottry" Tile	12 " "	50 " "	
12 x 4 x 1½ " "	12 " "	50 " "	
12 x 6 x 1½ " "	12 " "	50 " "	
6 x 9 x 1 " "	14 " "	50 " "	
8 x 4 x 1 " "	14 " "	50 " "	
6″ Hollow Rings	14 " "	60 " "	
3″ Quartz	22 " "	20 " "	to small per cent
6″ Corrugated Hollow Fluted Blocks	25 " "	35 " "	
1″ Coke	30 " "	15 " "	to small per cent
3″ Rings Hollow with Diaphragm	50 " "	50 " "	ideal

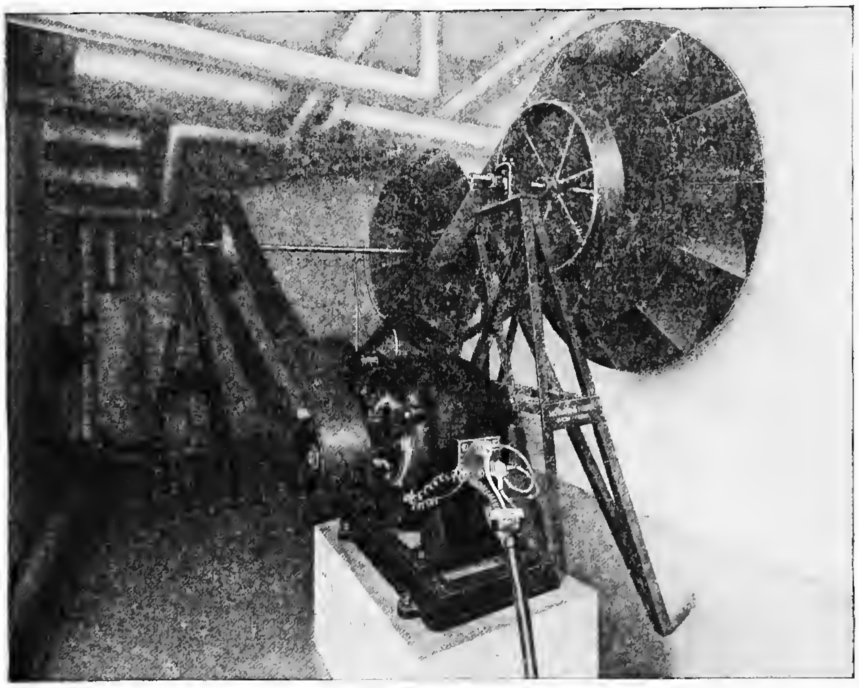
In packing Gay Lussac Towers, the lower fourth is packed with 6″ corrugated Hollow Fluted Blocks or 6″ Rings, and the upper three-fourths with 3″ rings dumped in at random so as to lay at all angles—thus checking the flow of gases and causing more perfect condensation. By using this method smaller towers can be constructed and the same efficiency derived as in larger towers packed with brick, or the output of present towers increased.

HOWARD & MORSE

45 Fulton Street
NEW YORK

PRODUCTS: Fans, Laboratory Testing Apparatus, Metal Work, Wire Cloth, Wire Grilles, Briquette Molds, Asphalt Flow Molds and Plates, Penetrometers, Vicat Needles, Ductility Machines

DUPLEX CONE FANS:



DUPLEX CONE FAN INSTALLATION—NO. 2 TYPE

HOWARD & MORSE DUPLEX CONE FANS:

These fans have been designed and patented to produce any pressure required in any plenum or exhaust system, as in many such installations the disc fan would fail in effect.

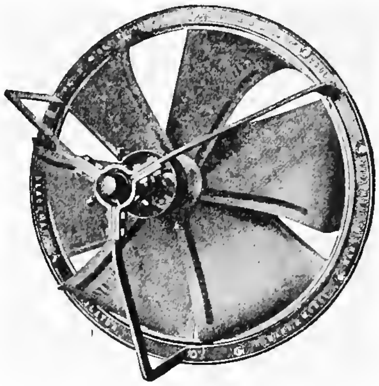
See our Catalogue for power and volume tables.

Fans can be direct connected, arranged with extended shaft or belt driven.

Our Duplex Cone Fans and our "Blackman" Fans are interchangeable on the same shafts, rings and bearings.

"BLACKMAN" FANS:

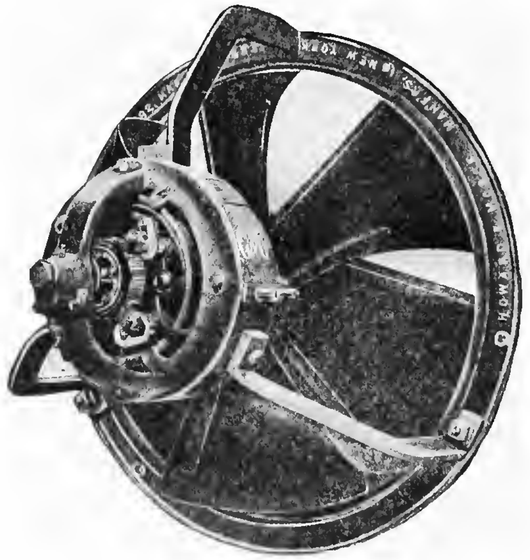
We have these fans in stock made of iron material, but manufacture to order fans with wheels made of copper, phosphor bronze, aluminum or monel metal for atmosphere saturated with moisture or acid fumes.



HOWARD & MORSE BLACKMAN VENTILATOR
Arranged for belt drive

Prominent architects and engineers specify these fans for duct work and free circulation on account of the accuracy of our volume and horse-power tables.

Compare with others.



BLACKMAN FAN
Direct connected to C. & C. Motor

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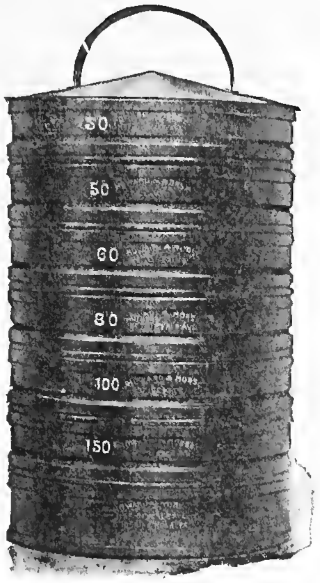
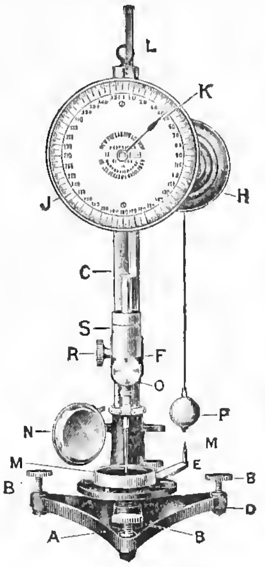


TESTING SIEVE D. P. STYLE



STANDARD PENETROMETER

LABORATORY TESTING APPARATUS:

Sieves

Briquette Molds

Asphalt Flow Molds

Asphalt Flow Plates

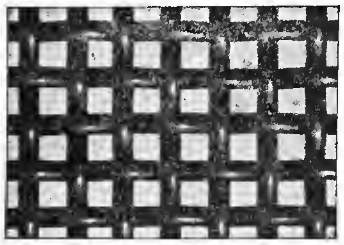
Vicat Needle

Penetrometers for hand and power operation

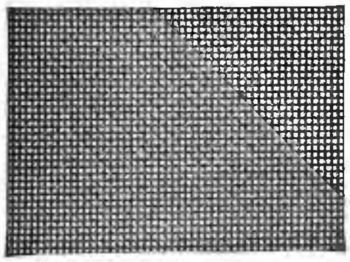
The Per Se Testing Sieve Agitator

Ductility Machines

SEND FOR CATALOGUE NO. 301F.



NO. 4 MESH—NO. 12 WIRE

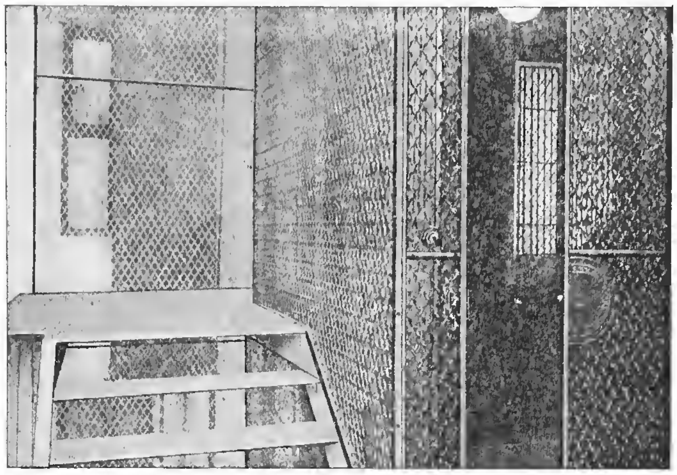


NO. 30 MESH—NO. 28 WIRE

WIRE CLOTH:

We can make anything required for drying, cooling, scouring and filtering of steel, brass, copper, galvanized wire or rods, or any ductile metal.

Correspondence Solicited.

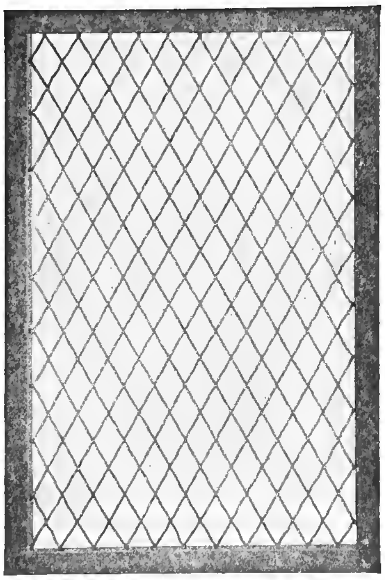


ELEVATOR ENCLOSURE

ARTISTIC METAL WORK IN ALL METALS:

Wire Guards for windows, Wire Partitions for Offices, Banks, Factories, etc. Wire Enclosures for Tellers, Elevator Cars, Elevator Shafts and Protection to machinery parts which will comply with factory inspection regulations.

WIRE GRILLES OF MANY PATTERNS WITH ROUND, CHANNEL OR ANGLE FRAMES:



For use in Schools, Banks, Churches, Hospitals, etc.

IMPORTANT POINTS:

When requesting bid, please state:
Size of Opening, Size of Mesh
Size of Wire, Pattern by Plate Number

SEND FOR CATALOGUE NO. 171.

HUFF ELECTROSTATIC SEPARATOR CO.

Principal Office and Works

60 India St. - - - - BOSTON, MASS.

Western Office: AMERICAN ZINC ORE SEPARATING CO., 1218 Foster Bldg., DENVER, COLO.

Cable Address: "Hesco"

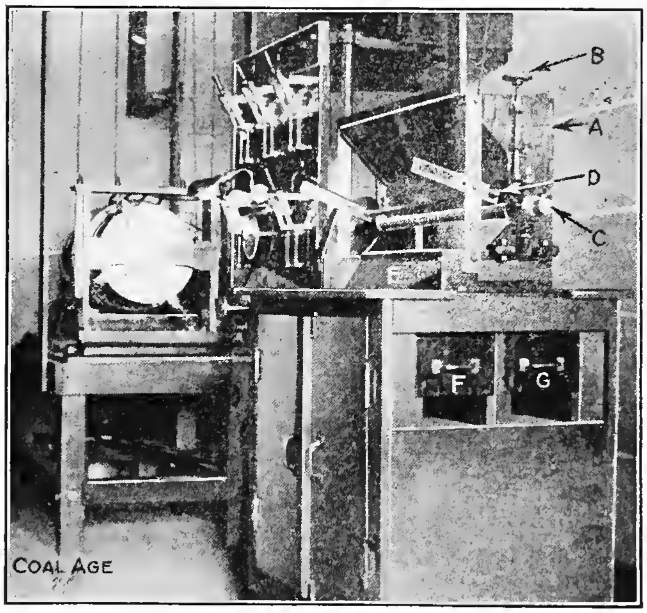
Code: Bedford McNeill

Representatives of PLUMB PNEUMATIC JIG CO.

PRODUCTS: Concentrating Machinery for the Separating of Ores, Table Products, Flotation Concentrates, Electric Furnace Products, Abrasives, etc. Graphite, American, Madagascar and Canadian.

SERVICES:

Investigation of Milling Problems, especially the refining of graphite; design of advanced methods for concentration and separation of ores.



LABORATORY TESTING EQUIPMENT

A. Feed Hopper.
B. Feed Adjusting Gate.
C. Revolving Electrode.
D. Stationary Electrode.
E. Adjusting Divider.
F. Repelled Concentrates.
G. Tailings.

The Huff Electrostatic Separator operates independently of the difference in specific gravity or magnetic permeability of the materials to be separated.

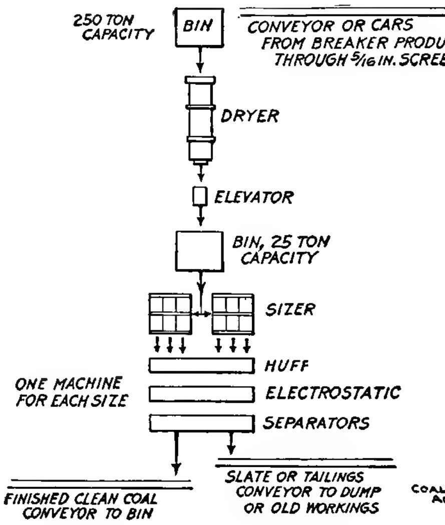
The Electrostatic process either alone or in combination with the Plumb Pneumatic Jig offers a cheap and efficient method of separation of most all materials.

POSSIBILITIES OF ELECTROSTATIC SEPARATION:

Practically all Sulphides and Oxides from their gangues.

Flue Dust
Coal and Bone
Rutile and Ilmenite
Monazite Sands
Zinc-Iron (without roasting)
Vanadium Ores
Tungsten Ores
Copper Ores
Bismuth Ores
Molybdemite Ores
Iron Ores

Many other materials in which there is a difference in electrical conductivity.


250 TON CAPACITY
BIN
CONVEYOR OR CARS FROM BREAKER PRODUCT THROUGH 5/16 IN. SCREEN
DRYER
ELEVATOR
BIN, 25 TON CAPACITY
SIZER
HUFF
ELECTROSTATIC
SEPARATORS
ONE MACHINE FOR EACH SIZE
FINISHED CLEAN COAL CONVEYOR TO BIN
SLATE OR TAILINGS CONVEYOR TO DUMP OR OLD WORKINGS
COAL AGE

GENERAL FLOW SHEET FOR THE TREATMENT OF COAL AND OTHER MATERIALS

The company maintains a well-equipped Laboratory and an engineering staff for the purpose of investigating separating problems and from ten years' experience in this line of work are equipped to recommend suitable mill equipment and design plants also systemize and put same into operation.

We also make a specialty of Graphite refining and three mills using our system of refining produce the highest grade Graphite for crucible making in the country.

Many valuable by-products may be saved by the use of the process.

THE HYDRAULIC PRESS MFG. CO.

Designers and Builders of

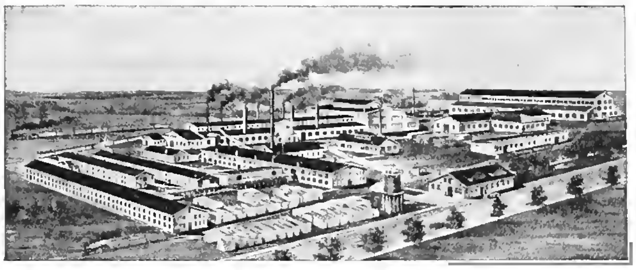
High Pressure Hydraulic Presses, Pumps, Valves, Accumulators and Intensifiers

Home Office and Factory

92 Lincoln Avenue - - MOUNT GILEAD, OHIO

BRANCH OFFICES

NEW YORK, Room 119-H, 39-41 Cortlandt St.
CLEVELAND, 416-F Citizens Building
KANSAS CITY, MO., 2712 Holmes St.
CHICAGO, 32 N. Clinton St., Division "F"
SAN FRANCISCO, 17th and Mississippi Sts.
SUFFERN, N. Y.
BUENOS AIRES, Argentine Republic



HOME OFFICE AND FACTORY: MOUNT GILEAD, OHIO

PRODUCTS: Hydraulic Pumps for Every High Pressure Purpose, hand, belt, motor and steam driven; Hydraulic Accumulators and Intensifiers. Hydraulic Steam Pump Speed Regulators and Governors. Hydraulic Valves and Fittings for High Pressure Purposes.

MOISTURE AND GREASE EXTRACTING PRESSES ETC.:

Hydraulic Presses for Tankage, Garbage, Fertilizer, Feed, Lard, Grease, Scarp (curb), Oleo, Tallow, Stearic Acid, Herb, Sheep Skin, Chamois Skin, Leather, Tanners' Yolk, Beet Sugar, Chicory, Chocolate, Oil, Seed Oil and Laboratory Presses and Equipment.

METAL WORKING PRESSES, ETC.:

Hydraulic Forming, Forcing, Flanging, Bending and Straightening Presses; Forging and Drawing Presses; Arbor, Broaching and Die Presses; General Purpose Presses; Hydraulic Car Wheel Presses; Scrap Metal Baling Presses, etc.

GLUING PRESSES, ETC.:

Hydraulic Wood Veneer Presses, Trucks and Retainers; Trunk Fibre Veneer Presses and Retainers.

JUICE EXTRACTING PRESSES, ETC.:

Hydraulic Cider, Grape Juice and Wine Presses; Cider, Grape Juice, Wine, Vinegar and Jelly Makers' Equipment and Supplies.

OIL EXTRACTING PRESSES, ETC.:

Hydraulic Olive Oil Presses, Seed Oil Presses, etc. Hydraulic Presses of all kinds for Extracting Oil.

BALING PRESSES, ETC.:

Hydraulic Baling Presses for all purposes such as: Box Baling Presses for Cotton, Cotton Waste, Waste Paper, Cork Chips and other Loose Material; Open Baling Presses for Cotton, Bags, Cloth, etc.; Scrap Metal Baling Presses, etc.

PRESSES FOR SPECIAL PURPOSES, ETC.:

Abrasive Wheel Presses, Automobile Wheel Rim Presses, Brake Shoe Filling Presses, Briquetting Presses, Cloth Finishing Presses, Cold Plate Presses, Cork Presses, Dental Presses, Drawing Presses, Electrode Presses, Embossing Presses, Emery Wheel Presses, Fagot Bundling Presses, Horn Comb Presses, Hot Plate Presses, Leather Belt (double) Presses, Paper Calender Roll Presses, Paper Pulp Presses, Powder Presses, Pulley Gluing Presses; Rubber Presses, Rubber Substitute Tire Filling Presses, Salt Block Presses, Silk Finishing Presses, Stone Presses, Tile Presses, Clay Forming Presses, Tufting Presses, etc.

Special Hydraulic Presses for special purposes are designed and built to suit peculiar existing conditions.

ADVANTAGES:

Some of the principal advantages which our hydraulic presses have over screw, cam, knuckle joint, geared and other types of presses are as follows:

Automatic features.
Great range of speed.
Economy in operation.
Simplicity in operation.
Simplicity in construction.
Reduction of attendant labor.
Flexibility in transmission of power.
Absolute regulation of amount of pressure.
Easy control and safety from accident.
Adaptability to diversified lines of industry.
Low frictional loss in working parts, therefore less loss of power in operation.
Automatic continuance of maximum pressure regardless of change in volume of material being pressed.

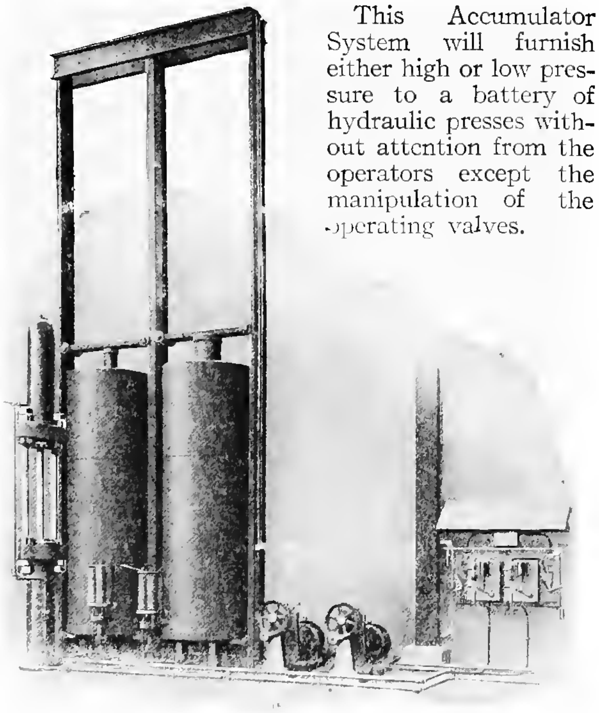
It is impossible to give on these three pages even a beginning of a comprehensive idea of the hydraulic presses and pumps which we build for industries in

Continued on Next Page

which the domain of chemistry enters. No attempt is made to do so. We show only a few types of presses and pumps to convey to those desiring machinery of this class an idea that we are equipped to build everything in the line of hydraulic machinery. Our experience in building hydraulic machinery exclusively—nothing else—covers a period of forty years, during which time we have constructed thousands of different types of complete hydraulic machines and solved hundreds of different hydraulic engineering problems. In brief, our line of Hydraulic Machinery covers "A Hydraulic Press, Pump, Valve, Accumulator and Intensifier for Every High Pressure Purpose." No matter what or how intricate your pressing needs may be we have a design to meet your approval. If you are contemplating any kind of hydraulic press or pump installation, you cannot afford to purchase elsewhere before first consulting us for recommendations.

HIGH AND LOW PRESSURE HYDRAULIC ACCUMULATOR SYSTEMS: With Intensifier and Automatic Control—

This Accumulator System will furnish either high or low pressure to a battery of hydraulic presses without attention from the operators except the manipulation of the operating valves.



The high and low pressure triplex hydraulic pumps furnishing the water supply against the pressure of the accumulators are motor driven. This is merely one of our many types.

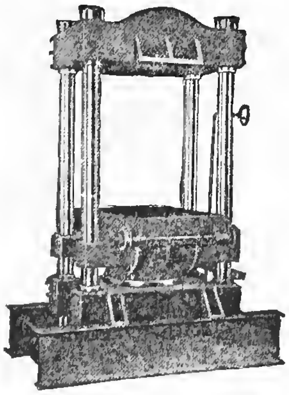


FIG. 755

500-TON HYDRAULIC OLIVE-OIL PRESS:

Fig. 755—This 500-ton press is used for expressing oil from olives. This work requires high pressure and a very strong and rigid press. We have several more sizes besides Fig. 755. Write us.

HYDRAULIC TANKAGE, FERTILIZER AND GARBAGE PRESSES:

Fig. 430—This press is used by packers, renderers, garbage reducers, fertilizer manufacturers, glue makers, distillers, etc. It is operated by a pump installed separate from the press. This press is representative of a score or more presses used for this class of work.

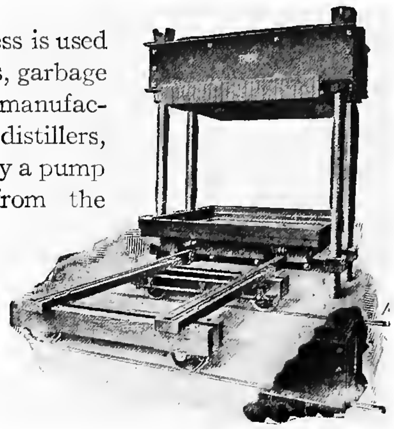


FIG. 430

800-TON HYDRAULIC CUPPING AND DRAWING PRESS:

Fig. 1307-A — This press illustrates an 800-ton Hydraulic Drawing Press designed and built for The Prest-O-Lite Company, Inc., Indianapolis, Ind., for forming and drawing seamless casings for retaining their dissolved acetylene. Five complete and distinct forming and drawing operations are performed on this press, the description of which is very interesting—write for it.

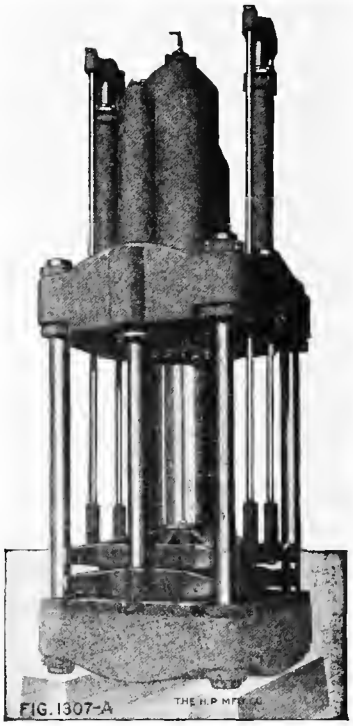


FIG. 1307-A

1600-TON HYDRAULIC FORMING PRESS: For Heavy Requirements.

Fig. 628 — This press has a pressure capacity of 1600 tons. It is representative of our presses for heavy requirements, being designed for use in forming metal doors from steel plates for covering the vestibule steps of Pullman coaches and for other similar purposes.

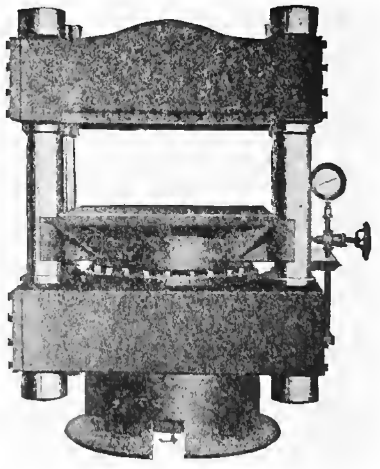


FIG. 628

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HYDRAULIC SCRAP (CURB) PRESSES:

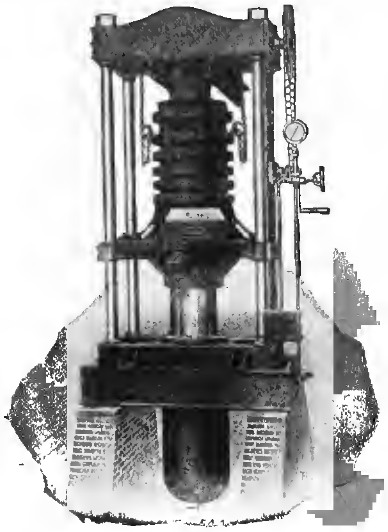


Fig. 544 — This press is representative of our hydraulic curb presses for pressing grease, etc., from packers' and renderers' scraps. Our curb presses are used by the largest meat packers in every section of the world. It is impossible to give a clear conception of our presses for this work in this limited space, but our Catalog No. 45 does so — write for it.

HYDRAULIC CHEMICAL LABORATORY PRESS:

The press illustrated by Fig. 730 is designed and used for experimental or chemical laboratory work. The cut shows the press equipped with a steel slat curb, cylindrical plunger, and a copper pan to receive the expressed liquids. This equipment can be removed and small racks or plates and cloths used, or the press can be used for pressing without any of this equipment. The press has a pressure capacity of 22 tons; a daylight of 20 inches and a pressing surface of 12 inches square.

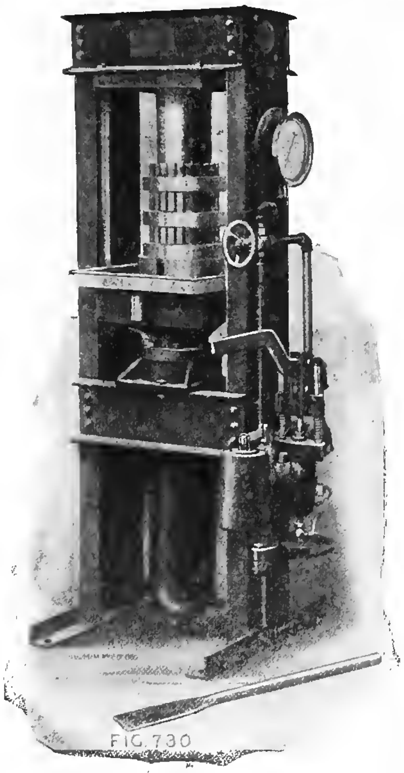
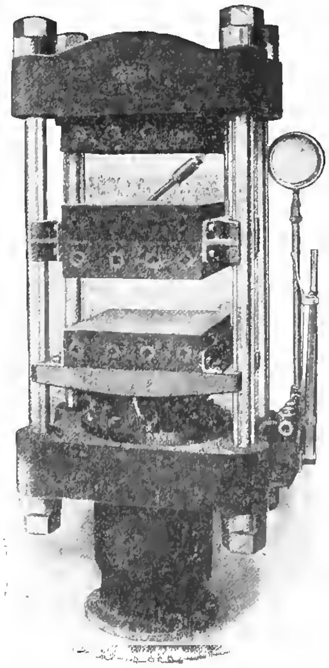


FIG. 730

HYDRAULIC HOT PLATE PRESSES:

Fig. 989-A — Hot plate presses are used for many purposes in the chemical industry. We build such presses for every purpose with any desired number of plates, which are either steam or gas heated, or water cooled. Write us for details.



TRIPLEX HYDRAULIC PUMP:

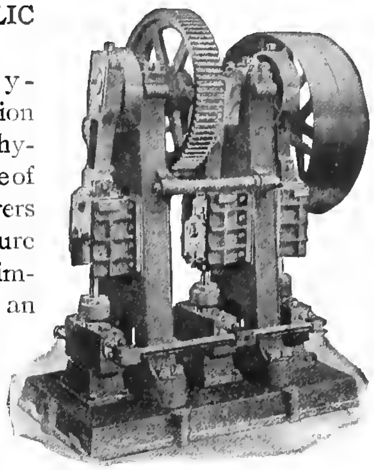


FIG. 748

Fig. 748 — No Hydraulic press installation is stronger than its hydraulic pumps. Our line of hydraulic pumps covers so many high pressure purposes that it is impossible to give even an idea of its extent here. This cut is representative of our vertical triplex hydraulic pumps. We build twenty different types of hydraulic pumps and our Catalog No. 44 illustrates them all—write for it.

HYDRAULIC STEAM PUMPS:

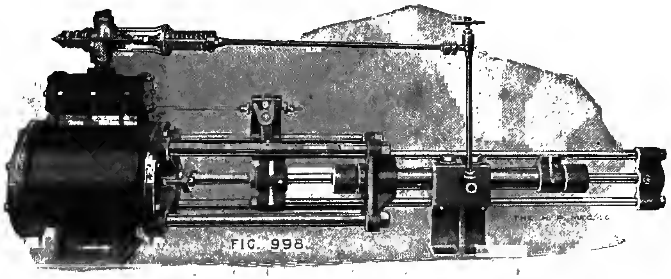


FIG. 998

Fig. 998 is a representative type of our hydraulic steam pumps. Based upon the dimensions of the water plungers our line consists of a few less than one hundred sizes. The designs include all the latest improvements in steam-pump practise. These pumps are the single cylinder, double-acting type. They are built for operating hydraulic presses at high or low pressure and for fast or slow speed as desired.

Fig. 998 shows our Hydraulic Steam Pump Pressure and Speed Governor attached. This governor can be attached to any of our Steam Pumps. It automatically stops the pump at the maximum high pressure and prevents racing when the pressure is released.—Ask for Catalog No. 44.

HYDRAULIC VALVES AND FITTINGS:

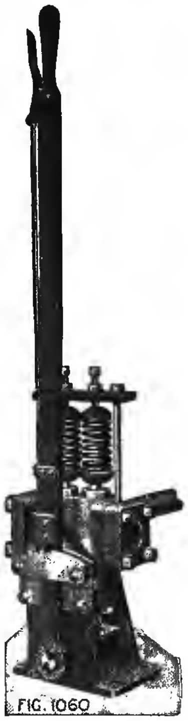


FIG. 1060

Fig. 1060—Good economical operation of your hydraulic press equipment cannot be obtained unless your pressure is controlled by efficient hydraulic valves. We build hydraulic valves for all purposes for controlling pressures up to 10,000 pounds per square inch. Write us your requirements. Fig. 1060 is shown only as a representative type of valve—our Catalog No. 43 illustrates our entire line—write for it.

Ask about our Hydraulic Fittings for high-pressure service.

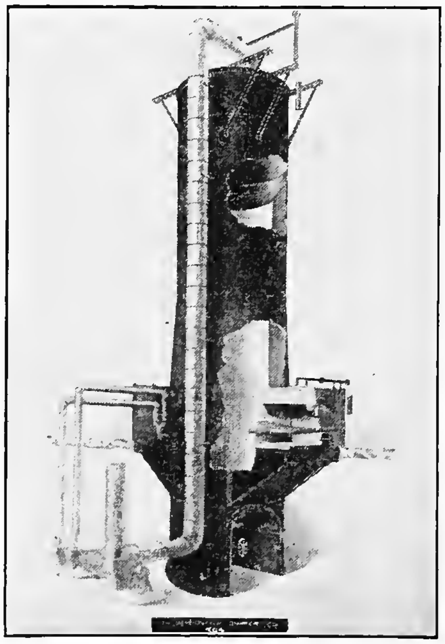
THE IMPROVED EQUIPMENT COMPANY

COMBUSTION ENGINEERS

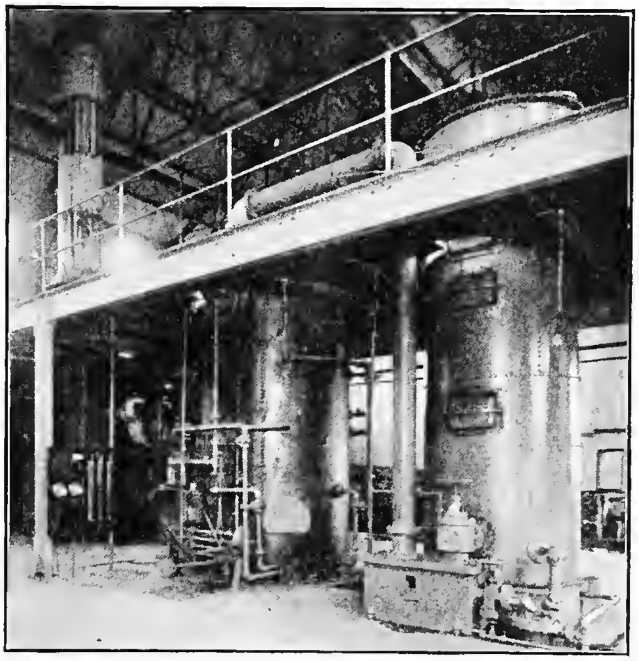
60 Wall Street
NEW YORK CITY

PRODUCTS:

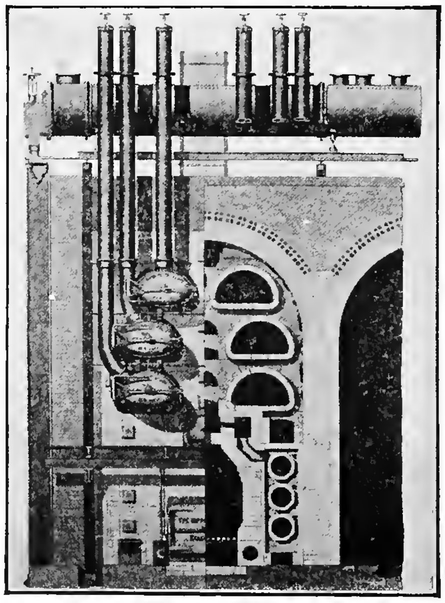
Special Industrial Furnaces; Complete Gas Plants; Coal Gas Benches—Silica Retorts and Settings; Lime Burning Plants; Lime Kilns; Hydrogen Plants; Refractory Materials.



LIME KILN EQUIPPED WITH THE DOHERTY-ELDRED PROCESS



PLANT AND APPARATUS FOR MANUFACTURE OF HYDROGEN IN LARGE QUANTITIES



LARGE MUFFLE OR RETORT FURNACE EQUIPPED WITH THE DOHERTY BENCH FUEL ECONOMIZER

Designers and Builders of:

Special Furnaces for Chemical Industries

Complete Gas Plants

Coal Gas Benches equipped with the Doherty Bench Fuel Economizer

Lime Burning Plants

Lime Kilns equipped with the Doherty-Eldred Process

Hydrogen Plants

Blue Gas Plants

THE INSTITUTE OF INDUSTRIAL RESEARCH

[INCORPORATED]

ALLERTON S. CUSHMAN
Director
HENRY C. FULLER

HENRY A. GARDNER
Asst. Director
GEORGE W. COGGESHALL

CHEMICAL AND ENGINEERING LABORATORIES
CONSULTING CHEMISTS AND CHEMICAL ENGINEERS
PLANT DESIGN AND CONSTRUCTION

19th & B Streets N. W. Founded 1910 **WASHINGTON, D. C.**

SERVICES:

Investigation and Improvement of Processes of Manufacture; Cooperation with Manufacturers in the Reduction of Costs and the Utilization of By-Products and Waste; Investigation and Improvement of General Metallurgical, Mining and Agricultural Operations; Dissemination of Information Regarding such Improvements; Investigation of Problems Relating to Paint Technology, Electrical Engineering, Electrochemistry; Foods and Drugs; Institution of Economies and Improvements in the Manufacture of Fertilizers and General Chemicals.

VIEW OF LABORATORY

DIVISION OF METALLURGY:

The Division of Metallurgy is prepared to undertake work in all problems in the line of metallurgy, including the mining, chemistry and evaluation of fuels and industrial minerals. Special attention and study have been given to corrosion problems and methods of overcoming these difficulties. Examinations and reports on water supplies are handled in this Division. This work is taken up in both the sanitary and industrial phases of the subject, and includes sewage and drainage problems.

DIVISION OF PAINT TECHNOLOGY:

The Division of Paint Technology possesses specially designed and thoroughly equipped paint laboratories. The work includes extensive exposure tests in different sections of this country, designed to determine the comparative merits of protective coatings and paint products for various structural materials, important laboratory researches to determine the physical and chemical properties of oils and oil mixtures, and research work to determine the usefulness of various products as paint constituents.

Consultation offered upon special problems which demand investigation work. The study of oils, oil substitutes, thinners, primers, driers, and waterproofing compounds represents an important branch of the work of this Division.

DIVISION OF FOOD AND DRUG PROBLEMS:

This division handles problems connected with the commercial production of all classes of food and drug products, working out new processes, developing the utilization of by-products and conducting routine and analytical work. It has made a specialty of handling chemico-legal questions related to the labeling of goods, drugs and insecticides affected by state and national legislation; it furnishes expert advice and assistance in litigation and maintains a fully equipped laboratory for performing bacteriological and toxicological tests and investigations.

DIVISION OF ELECTRICAL ENGINEERING, PHYSICS, AND ELECTROCHEMISTRY:

This Division of the Institute is prepared to undertake experimental work in the field of applied electricity, physics and electrochemistry; to assist inventors in developing their ideas, machines or processes; to furnish scientific data to the Patent Office for such clients in cases of complicated applications, and to give expert testimony in patent litigation.

DIVISION OF MILL PROBLEMS:

The Division of Mill Problems is organized to adapt laboratory results to the mill scale of operation. A specialty is made of designs and estimates for modernizing old industrial plants and the construction of new ones.

DIVISION OF ROADS AND PAVEMENTS AND MATERIALS OF CONSTRUCTION:

Two well-equipped laboratories have been given over to this Division, the "Cement and Testing Laboratory" and the "Bitumen Laboratory."

The "Cement and Testing Laboratory" is devoted to the physical testing of cements, rocks, clays, brick, block, iron, steel, wood and other materials or construction.

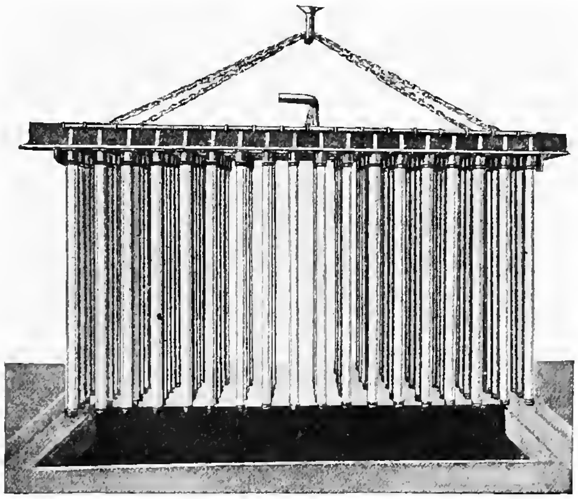
In the "Bitumen Laboratory" petroleum and petroleum products, tars and tar products, creosoting oils, asphalts, bituminous emulsions, bituminous aggregates and all other types of chemical road and paving materials, roofing materials, rubber, etc., are examined and tested. Chemical examinations of rocks, clays, cements, etc., are made here, and researches conducted on improvements in industrial products and processes and the utilization of waste products for road purposes.

INDUSTRIAL FILTRATION CORPORATION

Engineers

115 Broadway NEW YORK

PRODUCTS: Open Tank Cell Filters, Continuous Rotary Filters, Continuous Rotary Thickeners and Clarifiers, Continuous Rotary Hopper Dewaterers, and Special Filtering Apparatus for Chemical and Industrial Filtration.



OPEN TANK FILTER

OPEN TANK FILTER:

Consists of a number of filter cells attached to a common header, in conjunction with a movable hoisting device and a series of tanks.

Operation:

Filtration is accomplished by the application of suction behind the filtering medium, which draws through the clear filtrate leaving the solids deposited in the form of a cake which may be washed prior to being discharged by air pressure.

Features:

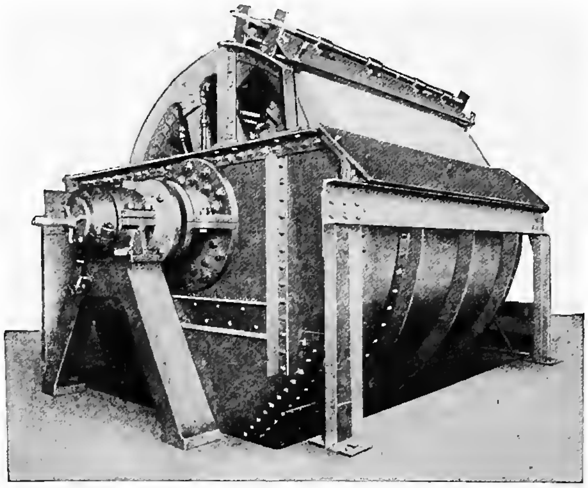
1. Inspection and control of solution at all times.
2. The most perfect method of washing known.
3. Immediate and automatic discharge, requiring no scraping of the cake.

CONTINUOUS ROTARY FILTER:

Consists of a container in which is hung a drum whose periphery is divided into a number of shallow compartments connected by separate pipe lines to a specially designed valve.

OPERATION:

While the drum rotates, the application of suction to the various compartments causes the clear filtrate to pass through the filtering medium, pipe lines, and valve to the desired point, leaving the solids deposited upon the surface of the drum in the form of a cake which is automatically discharged over an apron or doctor by air pressure. Washing may be accomplished by special attachments for this purpose.



CONTINUOUS ROTARY FILTER

Features:

1. Continuous automatic operation.
2. No manual labor required.
3. Cake formed, washed, and discharged during every revolution of the drum.

ROTARY THICKENER AND CLARIFIER:

This machine is somewhat similar to the rotary filter, but operates in a closed container and discharges the solids below the surface of the liquid. It is specially adapted to solutions containing small amounts of solids. It is also very efficient as a mechanical settler.

ROTARY HOPPER DEWATERER:

This type differs from the rotary filter in that it has no container, that each compartment consists of a hopper or elongated compartment with a filter bottom and that the material is fed to the machine from an overhead chute. It is adapted to the washing and dewatering of granular materials where the separation of solids from the liquid is rapid. It also is well adapted to the separation of finely divided particles in suspension from coarse material.

SPECIAL FILTERING APPARATUS:

In addition to the particular types mentioned, the Company manufactures special forms of apparatus for chemical and industrial filtration and makes specially constructed machines for handling acid or alkaline solutions.

THE INTERNATIONAL GLASS CO.

Caloris Dept.

MILLVILLE, N. J.

PRODUCTS: Glass Tubing from 3m/m to 3 inches Diameter, any lengths; Acid Pipe Lines; Laboratory Glassware; Scientific Apparatus.

GENERAL INFORMATION:

We make many articles which formerly had to be imported.

Our "Insol" tubing, Beakers and Flasks, are equal to any heat resistance glass made abroad.

We do not issue a catalog.

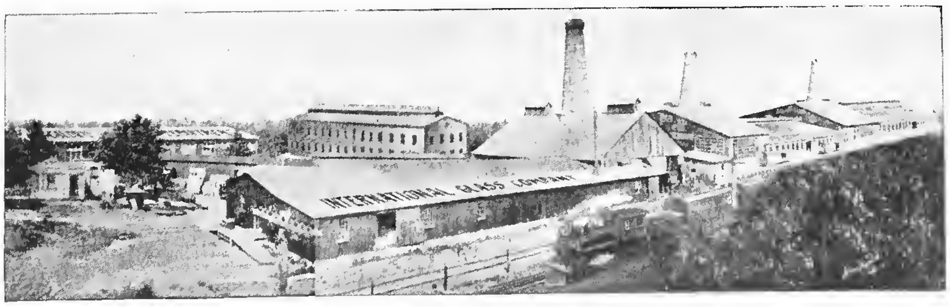
Correspondence Solicited.

SPECIALTIES:

A few of our specialties are listed below:

Beakers-Flasks,
Distilling Flasks,
Erlenmeyer Flasks,
Erlenmeyer Filtering Flasks,
Kjehdahl Flasks,
Carbonic Acid Flasks,
Volumetric Flasks,
Condensers,
Condenser Tubes,
Pipettes,
Glass Funnels,
Stop Cocks,
Burettes,
Gas Washing Bottles,
Weighing Bottles,
Glass Cylinders,
Vacuum Bottles, and tubes.

Many other articles not listed.



OUR PLANT AT MILLVILLE, N. J.

JANTZ & LEIST ELECTRIC CO.

CINCINNATI, OHIO, U. S. A.

Manufacturers of

GENERATORS FOR ELECTROLYTIC WORK

ELECTRIC MOTORS AND GENERATORS, STANDARD VOLTAGES

Phone West 2640 **Cable Address "JALECTRIC"** **Western Union Code**

PRODUCTS: Low Voltage Generators for Electrolytic Work, Electroplating, Electro-Cleaning or General Deposition of Metals or Special Chemical Work. These machines are built in sizes from 150 amperes' up to 10,000 amperes' capacity, either belt or motor driven. Motor can be alternating or direct current.

LOW VOLTAGE GENERATORS:

These low voltage generators are built commutating pole and compound wound to insure practically an even voltage at whatever set for with the shunt rheostat at the machine from no load to 50% overload. These machines are built full and large for full load continuous duty without overheating in any part.

The brushes are copper and graphite, held in our reaction type brush-holders. Each brush-holder stud carries a multiple of brushes and each brush is connected by flexible copper lead, so that there will be no loose parts to carry current.

Commutators are built out of hard rolled copper, thoroughly insulated with mica, and substantially held in position by heavy clamp.

Armatures are the iron clad type, notched to receive the windings that consist of a multiple of rectangular copper bars, thoroughly insulated in the slot and paint insulated outside, with air space between windings, so as to get a free air suction from the center of the armature to the periphery, allowing the machine to run practically cool at full load, and within the heating limits allowed by the A. I. E. E.

These machines are built in the following sizes and voltages, 2 and 3 wire service:

150-200-400-600-800-1000-1200-1600-2000-2500-3000-4000-5000-amperes in the single machines, and in the double generator sets from 300-400-800-1600-2400-3200-4000-5000-6000-8000-10000 amperes.

Some of these machines have been in service for the past 18 years and are still in good running order, bringing us repeat orders.

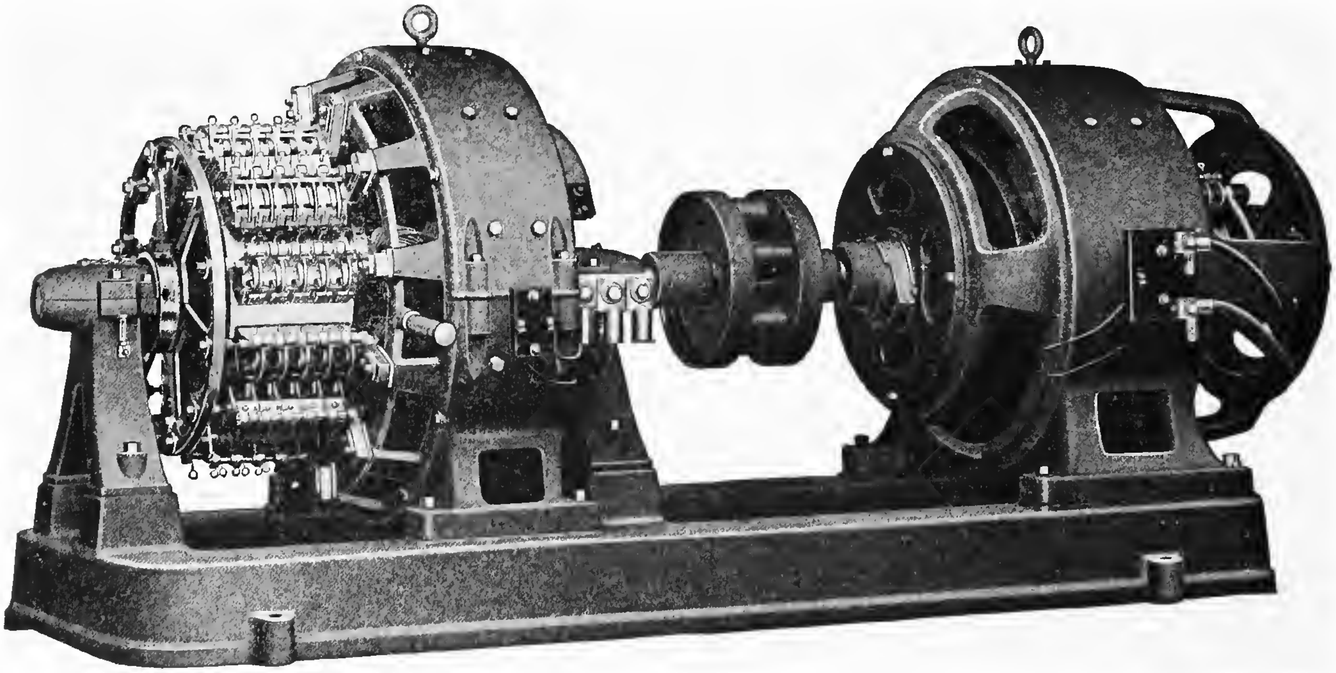
If you have any problems requiring low voltage with high amperage, we shall be pleased to go into detail and recommend the machine most suitable for your special requirements.

These are the most substantially built machines for this purpose on the market today.

Let us know your requirements.

STANDARD VOLTAGE EQUIPMENT:

We also manufacture direct current, standard voltage motors from 1 H. P. up to 500 H. P. constant and variable speed, direct current, standard voltage generators from 1¾ Kw. to 300 Kw. at 150 R. P. M., engine type.



Motor-Generator for Electrotypers, Platers, and General Deposition of Metals. Arranged with Copper Graph Brushes at Generator and Motor Commutator. Built in sizes from 150 to 10,000 amperes.

FRANKLIN H. KALBFLEISCH, Chairman ROBERT S. PERRY, President PAUL W. WEBSTER, Vice-President and Treasurer

THE KALBPERRY CORPORATION

Consulting Chemical Engineers

31 Union Square West Cable Address: OQUEDAL NEW YORK, N. Y.

SERVICES:

Investigation of proposed chemical and metallurgical investment and determination of its commercial desirability and financial soundness.

Examination of existing plant for efficiency of process, method and apparatus.

Design and supervision of chemical and metallurgical plant construction; initial operation and training of operatives.

THE KALBPERRY CONCENTRATOR:

The Kalbperry Corporation supply complete designs and license for the Kalbperry Concentrator for the concentration of acids and other liquids.

This concentrator is quickly constructed from standard stock material at low first cost and is cheaply operated.

It will concentrate either clean or dirty sulphuric acid to 60°, 66° Baume or 97% as desired.

It has been adopted and is working successfully in many plants and its users pronounce it an unqualified success.

SPECIAL PLANT CONSTRUCTION:

We specialize on the design of plants for manufacturing

Sulphuric Acid
Muriatic Acid
Nitric Acid
Acetic Acid
Chemical Salts
Lithopone
Blanc Fixe
White Lead

ROASTING OF ZINCIFEROUS AND OTHER SULPHIDE ORES:

We design plants and devise processes for the roasting of zinciferous and other sulphide ores, and the recovery of their metallic and acid contents.

PREVENTION AND ELIMINATION OF DUST AND FUME:

We are in a position to render expert service in designing and erecting plants for this purpose in connection with all chemical and metallurgical processes.

IT WILL BE OUR PLEASURE TO ANSWER YOUR INQUIRIES

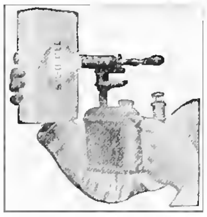
KIESELGUHR COMPANY OF AMERICA

NEW YORK 11 Broadway
CHICAGO Monadnock Bldg.
PITTSBURGH Oliver Bldg.
LOS ANGELES Van Nuys Bldg.
SAN FRANCISCO Monadnock Bldg.
KIESELGUHR COMPANY OF CANADA, 61 Sumach Street, TORONTO, CANADA

PRODUCTS: Sil-O-Cel for Insulation of Heat and Cold, Fireproofing and Sound-Deadening.

Filter-Cel, for Filtration of all kinds of liquids.

SIL-O-CEL
PREVENTS HEAT PENETRATION
TRADE MARK
MADE FROM CELITE



Sil-O-Cel Prevents Heat Penetration

Sil-O-Cel Products for Heat Insulation

GENERAL DESCRIPTION:

Sil-O-Cel Brick and Powder is especially prepared from the highly siliceous natural mineral Celite. Sil-O-Cel is used as a backing for the more highly conductive fire brick, and its insulating value is 10 to 12 times that of ordinary firebrick.

It is not subject to decomposition or change at high temperatures, and vibration will not cause it to settle or shrink when properly installed.

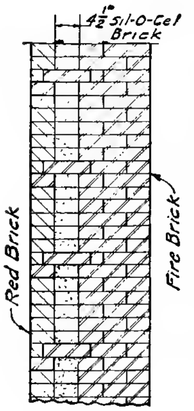


Fig. 1

APPLICATION OF SIL-O-CEL BRICK:

Sil-O-Cel Brick is interlaid between a course of firebrick and red brick (see Fig. 1) for the prevention of heat leakage through the walls of furnaces, boiler settings, etc. This form of construction is generally applicable where a strong, solid non-conducting wall is desired. Metal bonds can, of course, be used if preferred, and the insulating material built up in a uniform course.

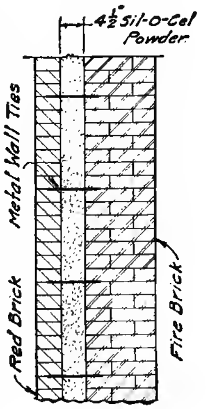
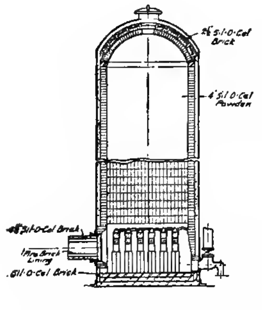


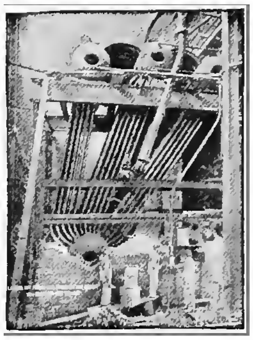
Fig. 2



Hot Blast Stove Insulated with Sil-O-Cel

APPLICATION OF SIL-O-CEL POWDER:

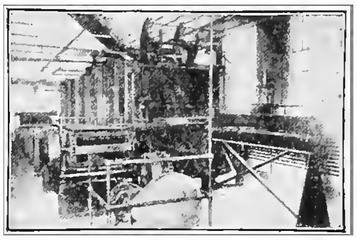
Diagram (Fig. 2) shows construction of insulating wall in which an otherwise hollow space is filled with Sil-O-Cel Insulating Powder. From 2 to 4 inches are usually sufficient. This powder is packed slightly to a density of 12 to 15 pounds to the cubic foot, at which point it attains its maximum insulating value and will not settle.



Laying up Sil-O-Cel Insulating Brick in Boiler Setting

FOR BOILER SETTINGS, ETC.:

Sil-O-Cel in both brick and powder form is perfectly adapted as an insulating backing or filler to prevent heat losses through firebrick walls, in boiler settings, furnace walls, hot blast stoves, bakers' ovens, and general industrial work where it is not subjected to the direct action of fluxes or incandescent gases.



Annealing Furnace Insulated with Sil-O-Cel

FOR GAS-PRODUCING EQUIPMENT:

Sil-O-Cel is being used with very satisfactory results in the insulation of gas generating equipment. It absolutely conserves the heat, and prevents rupture, bulging or shearing of the shell. The flexibility of Sil-O-Cel when used in powdered form allows for variation in expansion and contraction between the firebrick and the shell, and eliminates excessive mechanical strains common to non-insulated equipment.

SIL-O-CEL INSULATING BRICK:

Sil-O-Cel Brick are 2½ x 4½ x 9″ in size, convenient to lay up with firebrick and red brick. Each brick weighs about 1¾ lbs., or approximately 30 lbs. per cu. ft.

The crushing strength is more than 400 lbs. per sq. in.—amply strong for any construction work, and of greater strength than any similar product on the market.

Sil-O-Cel Brick are packed in cartons of 25 brick each—a feature that insures ease of handling on the job, and a material saving in labor.

Sufficient Powdered Sil-O-Cel is supplied with each shipment of brick to produce cement for laying up brick in a monolithic insulating wall.

SIL-O-CEL INSULATING POWDER:

Sil-O-Cel Powder is shipped in burlap bags containing about 45 lbs. each, and when loosely packed weighs about 8 lbs. per cu. ft. It attains its full insulating value when packed to a density of 12 to 15 lbs. per cu. ft.

SIL-O-CEL PLASTIC CEMENT:

Sil-O-Cel Plastic Cement is an insulating cement of high thermal efficiency, and is used for pipe and boiler coverings, domes and other irregular heated surfaces where Sil-O-Cel Brick and Powder cannot be readily applied for structural reasons.

Continued on Next Page

FILTER-CEL

FOR FILTRATION

APPLICATION:

Filter-Cel is an unusually porous siliceous mineral product of light weight and high purity and is prepared so as to make it most effective as a filtering medium.

Small quantities of Filter-Cel are added to the liquid prior to filtration. The light weight of this medium simplifies the uniform mixing of Filter-Cel with the liquid to be clarified. After the addition and thorough mixing of the Filter-Cel with the liquid, filtration proceeds in the usual manner.

CLARIFICATION:

Due to the very light weight of Filter-Cel, small quantities have a remarkable effect in improving and facilitating the clarification and filtration of turbid liquids.

In the process of filtering by the aid of Filter-Cel a film of this substance builds up on the filter cloth. As filtration proceeds the very finest solids of the solution are held by this layer of Filter-Cel, and prevented from working their way through the cloth.

Filter-Cel has made possible the use of filter presses for the filtration of dense sugar liquors, etc., where formerly gravity filters of the bag type were the only means of handling liquors of this character. This results not only in a large saving in labor but also gives an absolutely clear filtrate, something that is not obtainable with the gravity types of filters. The Filter-Cel entrains the finest particles of suspended matter and prevents their passing through the cloth.

INCREASED FILTERING CAPACITY:

Filter-Cel greatly increases the capacity of filters. In many cases it is advisable to coat the cloths with a film of Filter-Cel prior to starting the filtration proper, or to add a large percentage to the first portion of liquor going to the press.

Press cakes obtained by this method fall readily from the leaves or plates, leaving the cloth clean for further operations.

INCREASED EXTRACTION:

Filtration with Filter-Cel gives a complete separation of solid and liquid. Press cakes are easily washed with a minimum quantity of solvent, due to the firm porous character of the cakes obtained. A very complete recovery of the soluble material is made.

CHEMICALLY INACTIVE:

Filter-Cel is an inert inorganic material that has no chemical action other than adsorption on the liquids into which it is introduced. Its perfect filtering action is due to the extremely fine channels through which the liquid passes when forced through a layer of Filter-Cel.

REMOVAL OF TURBIDITY:

Filter-Cel is particularly adapted to filtrations where the removal of small quantities of slimy suspended matter is desired. Clearer filtrates can be obtained by the use of Filter-Cel than by any other method of filtration.

LIGHT WEIGHT:

Filter-Cel lightly packed has a weight of about 8 lbs. per cubic foot. There is no other material that can approach it for bulk and lightness.

OPERATING COSTS REDUCED:

The use of Filter-Cel permits the use of thin grades of filter cloth with results superior to those ordinarily obtained by the use of very heavy cloths.

Furthermore the wear and tear on cloths is greatly reduced, due to the readiness with which press cakes having Filter-Cel incorporated in them, separate. This reduces laundering to a minimum and in many cases eliminates it entirely.

SUGAR SYRUPS, MOLASSES, GLUCOSE, ETC.:

Beet and cane sugar juices and syrups are filtered brilliantly clear and sparkling by the use of small quantities of Filter-Cel.

The filtration of these products ordinarily causes much difficulty, due to the high density at which it is necessary to handle these syrups and the slimy, gummy character of the impurities to be removed.

Filter-Cel provides a perfect medium for the elimination of such impurities and permits of the much more rapid and economical filtration of these products.

WINE, FRUIT JUICES, ETC.:

The perfect filtration of these products is of the utmost importance. The use of Filter-Cel insures a more perfect removal of suspended matter than can be obtained in any other way, thus yielding absolutely clear, sparkling products.

METALLURGICAL AND CHEMICAL USES:

The removal of small quantities of slimy impurities from dense solutions of copper, zinc, aluminum and other metals often entails great difficulties, as these fine suspensions either pass through the cloth or plug up the cloth so that it is impossible to secure a satisfactory rate of flow.

The addition of Filter-Cel will entrain these fine slimes and prevent their reaching the cloth, thus permitting the filtration to proceed at a normal rate and yielding an absolutely clear filtrate.

In the manufacture of high-grade chemicals, recrystallization can often be avoided by filtering the solutions with Filter-Cel prior to crystallization.

Filter-Cel permits the use of thin, loosely woven filter press cloths. In some cases the use of wire cloth is desirable. The wire cloth is first given a very thin coating of Filter-Cel, which then forms the actual filtering medium. Dense, viscous liquids can be filtered at a greater rate per square foot of filtering area by this method than by cloth filtration. Furthermore, the filtrates obtained are clearer and more brilliant than those obtained by the ordinary methods.

The solution of every filtering problem requires individual consideration and treatment in some particular phase of the operation.

Inquiries regarding difficult and unsolved problems in filtration are welcomed.

The services of the Technical Staff of this company are available to interested parties.

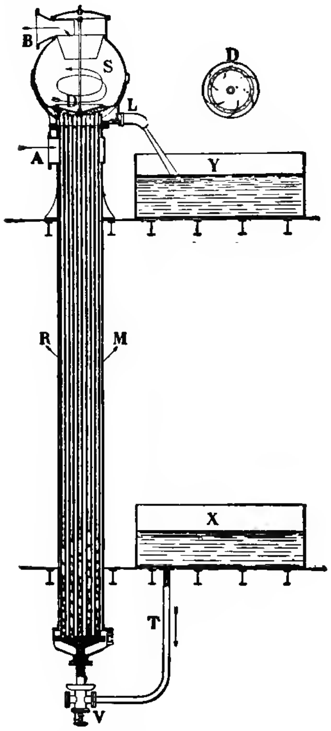
Samples of Filter-Cel for testing and experimenting will be supplied on request.

KESTNER EVAPORATOR CO.

18th Street and Allegheny Ave.
Cable Address: KESTEVAPCO

PHILADELPHIA, PA.
Lieber Code

PRODUCTS: Evaporators, Vacuum, Single or Multiple Effect; Evaporators, Pressure, Single or Multiple Effect.



SPECIAL FEATURES:

Principle of film-evaporation utilized without any complicated devices usually employed in circulating, regulating and distributing liquid.

Time of contact of the liquid under treatment with the heating surface about 30 seconds in each body; most sensitive materials uninjured.

Entrainment: Novel design of separators prevents entrainment and enables handling of foamy materials without loss.

Gas Extraction: Due to the long, narrow shell and high velocity of the vapor, all non-condensable gases are driven to bottom of the succeeding body through the condensed water pipe. This gives complete gas extraction with no loss of vapor or efficiency.

Economy: Evaporation per pound of steam greater in Kestner than in other types.

Volume of Liquid: Amount of liquid in film in tubes negligible; the few gallons in the feed chambers constitute the whole amount in transit.

Encrustation: Low in a Kestner due to high velocities maintained in the tubes.

Ease of Cleaning: When necessary to clean mechanically, the Kestner presents a distinct advantage over the short tube evaporator owing to limited number of tubes to be cleaned.

Floor Space: Less than for other forms of apparatus.

Cost: High in first cost but cheapest in upkeep. Quality of products produced unequalled.

USES:

Operating in sugar factories and refineries for sugar juice, sweet waters and glucose; distilleries for spent wash; wood-pulp mills for black liquor and bisulphite liquor; wool-washing works for suds and potash-water; glue and gelatin works; extract works for dye-wood, tannin, meat and licorice extracts; soap, dairy products and chemical works; caustic soda, mercerizing liquors, kelp liquors.

EVAPORATORS UNDER PRESSURE:

Built in single or multiple effect for use with exhaust steam at 10 lbs. or higher and with live steam. These evaporators will handle sensitive materials under high temperatures due to the extremely short time the material is in contact with the heating surface. Thus glue, cane-, beet- and milk-sugar and wood extracts can be evaporated.

This method of evaporation is economical as it eliminates the vacuum pump, circulating pump for condenser and the large volume of water required in the latter. All the heat units that would otherwise be lost in the condenser are saved and the condensed steam is returned to the boiler at a higher temperature than is possible when working under vacuum.

PRE-EVAPORATORS:

For increasing the capacity of existing evaporators where there is an insufficient supply of exhaust steam for heating and evaporating.

FIRE-HEATED EVAPORATORS:

For use on certain materials. These evaporators furnish all the steam required to operate the pumps, do the heating and evaporating in the later bodies of the multiple effect. Fuel economy is high. In this type 34 lbs. are evaporated to 1 lb. coal as against 26 lbs. in ordinary quadruple effect.

PATENTED CIRCULATORS:

To increase capacity of all types of existing evaporators.

SPECIAL APPARATUS FOR HIGH CENCENTRATION:

Operating under both pressure and vacuum for the high concentration of such materials as caustic soda to 50%, wood extracts to 10–15% water, glue to 15% water, sugar to grain, licorice, maple sugar, table syrup, milk sugar, meat extracts, fruit juices, wool suds, milk and many other substances.

L. O. KOVEN & BROTHER

Main Office: 154 Ogden Avenue, Jersey City, N. J.
New York Office: 50 Cliff Street

PRODUCTS: Autoclaves; Bins, for Coal, Grain; Boilers, Barbers' Hot Water, Fire Engine, Galvanized Range, Glue, Heating, Small Steam; Bottle Sterilizers; Boxes, Waste; Buckets, Self-Dumping, Tar; Cans, Ash and Garbage, Oil, Oily Waste, Powder, Refuse; Chemical Apparatus; Chimneys, Iron and Steel; Condensers; Coolers; Copper Tanks; Copper Lined Steel Tanks; Creosoting Tanks; Digestors; Distilled Water Apparatus; Drums; Dry Kilns; Drying Apparatus; Extractors; Filters; Furnaces, Annealing, Melting, Oil and Tar Melting, Producer-Gas Burning, Rivet; Gasometers; Glass Sterilizers; Guages, Indicating; Gum Washers; Heads for Boilers, Exhaust, Kitchen Range Boilers; Heaters, Feed-Water, Glue, Gravel; Hot-Water Tanks, Humidifiers; Jacketed Tanks; Kettles, Mixing, Soda and Potash, Steam Jacketed, Sugar, Tar, Wax; Kilns, Baking, China, Glass; Lead-Lined Tanks; Mixers; Oil Filters; Ovens, Bread, Core, Enameling, Proofing; Oyster Apparatus; Paint Machinery; Pans, Annealing, Drop, Gravel, Revolving, Vacuum; Percolators; Pipe, Hydraulic, Riveted; Plating Tanks; Pots, Melting; Pulverizers; Receivers for Air; Reclaimers; Sand Blast Machines; Separators, Steam; Solvent Recovery Apparatus; Snoke Stacks; Sprayers; Standpipes; Sterilizers; Stills, Fractionating, Water, Solvent Recovering; Tanks, for Acid, Air, Automobile, Blow-off, Brine, Creosoting, Closet Tanks, Expansion, Factory, Fuel Oil, Gas, Gasoline, Grain, High Pressure, Hot Water, Melting, Mixing, Oil, Plumbers', Pneumatic, Septic, Sewage Disposal, Soda Water, Tempering, Varnish, etc.; Water Supply Towers; Tubs; Vulcanizers.

SERVICES:

This Firm makes a specialty of the Design and Manufacture of Machines and Apparatus of all kinds for Engineers and Manufacturers. The partial list of products included herewith gives some idea of the variety of work which may be furnished to order.

The desired apparatus may be manufactured from the following metals: Sheet Iron, Copper, Bronze, Brass, Lead, Block Tin, Zinc, Monel Metal, Aluminum, etc.

Estimates will be furnished from specifications and drawings, or, if preferred, this Firm's engineers will submit plans of work desired, on consultation as to requirements.

KELLY FILTER PRESS:

We manufacture this press for Emil E. Lungwitz of 30 Church Street, New York.

The Kelly Filter Press represents a new epoch in the art of filtration. Wherever it is possible to filter cake-forming substances, whether valuable or worthless, to give the cakes obtained a thorough wash, filter valuable liquids under conditions that prohibit loss under evaporation, filter small quantities of worthless solids from large quantities of valuable liquids or small quantities of valuable solids from large quantities of worthless liquids, the Kelly Filter Press has positively proven its superiority over all other filtration devices.

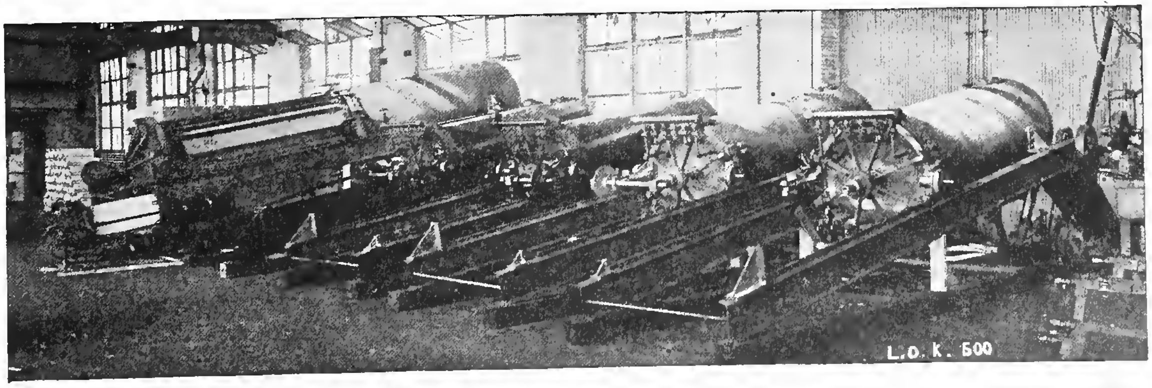
TESTS:

The varied uses in many industries to which Kelly Filter Presses have been successfully applied, has made it advisable for us to maintain a large testing plant in Salt Lake City. We will gladly make tests upon products sent us and urgently recommend that such tests be made to definitely determine capacities, proper filtering medium, operating costs, etc.

USES:

Kelly Filter Presses are being used successfully for the following:

Beet Sugar Manufacture
Cane Sugar Manufacture
Cane Sugar Refining
Cyanidation
Oil Refining
Acid Leaching
Clarifying
Paint Manufacture
Oil Refining
Nitrate Refining
Malt Refining
Sewage Disposal
Paper Pulp Manufacture
And in the manufacture of nearly all chemicals both heavy and fine.



MAURICE A. KNIGHT

EAST AKRON, OHIO

PRODUCTS: Acid Elevators, Acid Jugs, Acid Woulf Bottles, Acid Pots, Acid Pulsometers, Acid Montejus, Marrotte's Bottles, Bib Cocks, Cellarius Tourills, Check Valves, Chlorine Generators, Cocks, Cooling Worms, Coils, Cups-Tower Packing, Pipe-Dampers, Decanting Pots, Subliming Dishes, Suction Filters, Hollow Balls, Injectors, Boiling Kettles, Nitrating Kettles, Lanterns, Flanged Pipe, Socket Pipe, Pipe Fittings, Vacuum Receivers, Stills, Stirrers, Storage Vessels, Tanks, Tourills, Tower Packing, Towers Nitric, Towers Sulphuric, Towers Reclaiming, Valves, Vapor Pipe, Funnels, " S " Condensing Pipe, Steam Jets.

CLAYS FOR CHEMICAL PURPOSES:

There are big differences between clays from which the bodies for chemical stoneware are made. One body may be admirable for one set of conditions; whereas a combination of clays, properly proportioned, would make a better body for some other situation. We don't recommend one body for all conditions, but make seven different bodies, as below, that are practically adapted for uses as indicated.

(1) Structure is open. Will stand severe heating and sudden changes in temperature. May be used next to furnaces. Tough and durable. It is not attacked by acids, but when acid stands in it is liable to sweat. Will not crack.

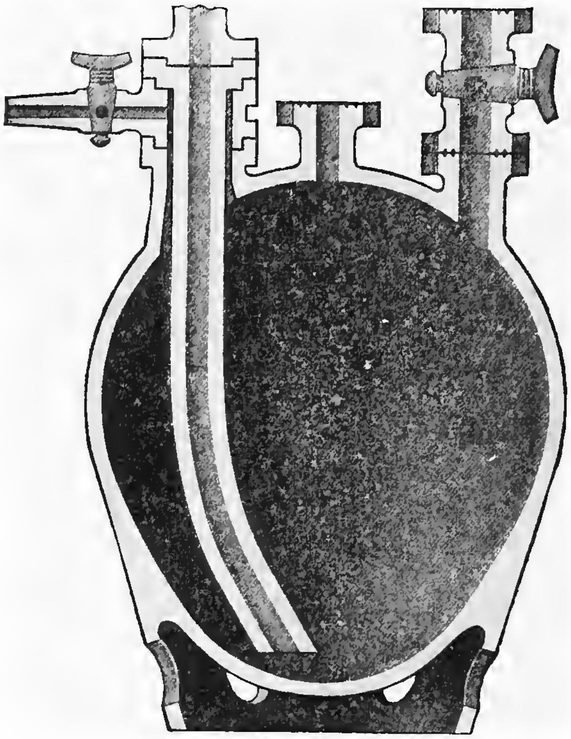
(2) More vitrified than No. 1. Tough. Withstands strains and stresses well. Will not crack. Can be exposed to sudden changes in temperature.

(3) Vitrified open body. Tough. Used in manifolds, tower pipe, base tower tile. Will not sweat or seep.

(4) More vitrified than No. 3 and denser. Somewhat open. Used in brick and tile for top-tower sections where heat is reduced. Withstands acid excellently and does not sweat or crack.

(5) Finer. Dense body. For conveying pipe and fittings, receivers, montejus, large jars and storage tanks.

(6) Denser than No. 5. For pipe, smaller tanks and receivers. Not suited to sudden changes in temperature.



ACID ELEVATOR OR FORCING EGG

With immediate fittings. Made strong and durable. Made in 20, 35, 50, 80 and 100-gal. capacity

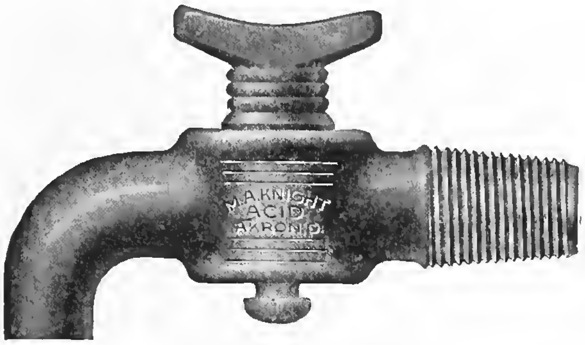
ACID-PROOF KETTLE

Made in any capacity from 50 to 250 gallons. Cover and outlets or inlets made to meet requirements

Continued on Next Page

(7) Very close structure. Clean washed, vitrified body of clay, passed through 80-mesh screen. Used in faucets, stop-cocks, valves, small containers, pitchers etc.

None of this stoneware is dependent for its acid-resisting qualities on a glaze, enamel or veneer, being acid-proof and vitrified throughout.

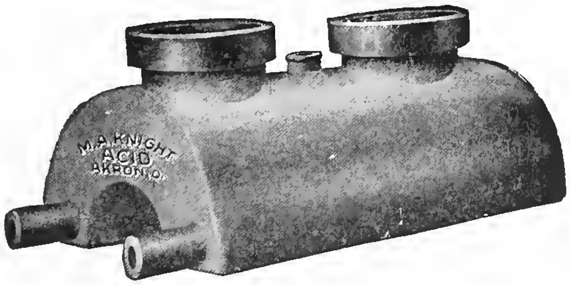


THREADED BIB FAUCET

All made in any bore up to six inches
Notice knob for holding lead washer

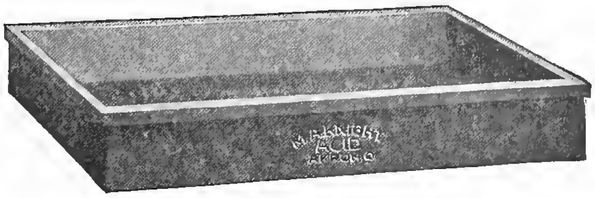
ACID-PROOF "S" OR CONDENSING PIPE

Made in any bore and in most any center



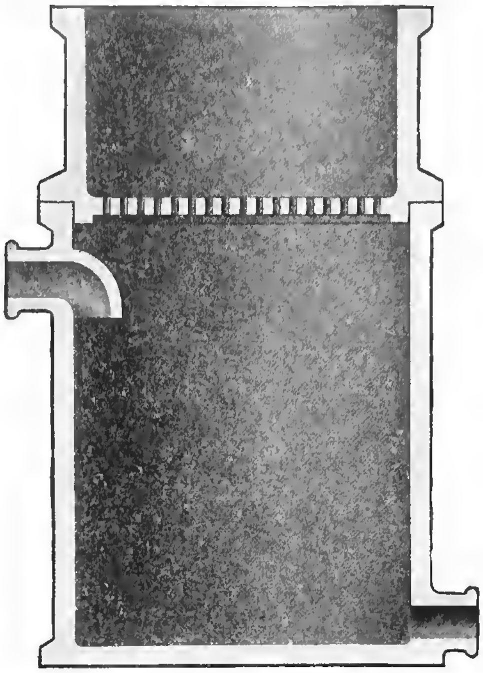
ACID-PROOF CONDENSING TOURILLS. UPRIGHT AND INVERTED

These Tourills have large cooling surface, which gives greatest absorbing efficiency. Made in three standard sizes



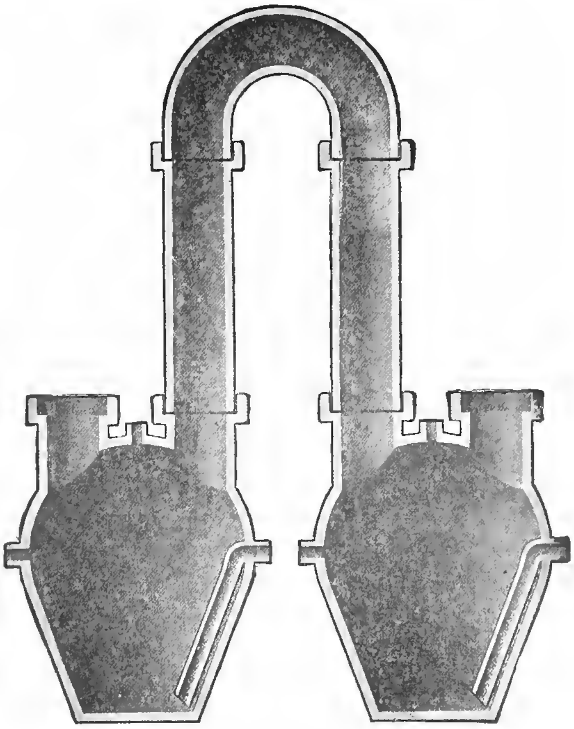
LOW ACID PROOF TANK

We make Acid Proof Tanks in any design or capacity. Outlets and partitions as required



ACID-PROOF SUCTION FILTER "B"

Made in most any capacity up to 100 gallon. Furnished with faucet and cover if desired



MURIATIC RECEIVERS OR JUGS

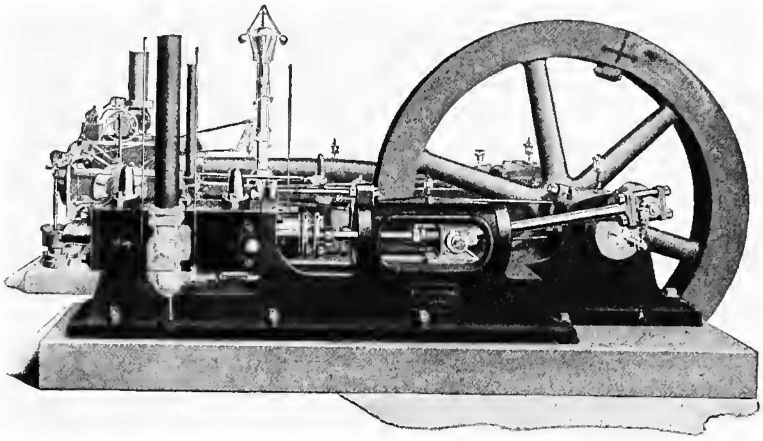
With connecting piping. Made thin, but strong and durable. We make receivers or Woulf Bottles in all designs and sizes

KROESCHELL BROTHERS ICE MACHINE CO.

460-472 West Erie Street
CHICAGO, U. S. A.

Eastern Office: 30 CHURCH ST., NEW YORK

PRODUCTS: **Refrigerating Machinery, Carbonic Anhydride.**



ADVANTAGES:

It is more compact and requires less space than any other. It is simple in construction and easy to operate. It is economical in the use of power and water. It is highly efficient. Its safety in operation places it above all other refrigerating machines.

Carbonic Anhydride is harmless and odorless. It is not combustible and can not cause explosions. It is a fire extinguisher. It is neutral toward materials and food products. It evaporates at the low temperature of -124° F. under atmospheric pressure.

DIRECT EXPANSION SYSTEM:

In the direct expansion system extra heavy wrought-iron pipe coils are placed in the rooms to be cooled, either on ceiling, walls or in lofts built for this purpose. Connections are made between the coils and Carbonic Anhydride liquid receiver at outlet of condenser. An expansion or regulating valve is placed between the small liquid pipe and large expansion coils. The liquid is fed through the expansion valve and allowed to expand through the coil to a gaseous state absorbing heat and is then returned to the compressor.

For general use the direct expansion system is preferable because it is the simplest system, requires less machinery, is more efficient, and needs less attention. With Carbonic Anhydride direct expansion can be used in many places where it would not be advisable with ammonia as in case of a leak in the expansion coils, no damage can result, while with ammonia the result would be disastrous.

BRINE SYSTEM:

The brine system is an indirect method of refrigeration; the Carbonic Anhydride does not evaporate in coils placed in the rooms to be cooled, but instead evaporates through coils placed in an insulated steel tank, or through a double pipe brine cooler.

Brine made by dissolving Calcium Chloride (or in some cases common salt) in water, is cooled by circulating it through a cooler equipped with Carbonic Anhydride coils and then pumped through brine coils in the different refrigerators and rooms. The brine absorbs heat in passing through the coils; returning to the cooler it imparts this heat to the Carbonic Anhydride.

In plants with a large number of small refrigerators, where the pipe runs are long, it is cheaper to install the brine system, as brine piping costs less than Carbonic Anhydride piping. When the refrigerating machine is not operated at night and even temperatures are required, the brine pump may be kept running, circulating the cold brine.

Whether brine or direct expansion should be used, depends entirely upon conditions, which should be thoroughly investigated before either system is installed.

USES:

These refrigerating plants are adapted for use in all the chemical industries where low temperatures are desired such as distilling, brewing, glue manufacture, solvent recovery, the collection and utilization of fermentation gas, photographic apparatus air conditioning, etc.

THE LABORATORY SUPPLY CO.

TRADE MARK
Ⓢ
CIRCLE "S"

Manufacturers and Jobbers of Scientific and Industrial Laboratory Materials

Works: 959 Factory Street
Office and Salesroom: 236 N. Third St.
COLUMBUS, OHIO

PRODUCTS: Laboratory Supplies.

"MADE IN AMERICA" LABORATORY WARE:

After many months of research, experiment, and development, we are pleased to announce the following: "Circle—S" specialties, "Made in America" by men especially trained and experienced in laboratory requirements.

OHIO POTTERY CO. Ⓢ LABORATORY PORCELAIN:

The highest fired, most homogeneous and resistant ware yet made on this continent. This ware stands sudden temperature changes. Our ware stands heating to 1700° F. and cooling in draft on a cold steel plate without injury. It is less soluble in acids and alkalis, and is less affected by Ferric Oxide Ignition than the Famous "Royal Berlin" ware. Stock forms include Beakers, Casseroles, Crucibles, Desiccator Plates, Combustion Boats, Evaporating Dishes, Buechner Funnels, Mortars, Color Plates, Spatulas, Porous Cups, Petri Dish Covers. This ware has been thoroughly tested and is guaranteed to stand all of the most exacting laboratory requirements. Special Shapes to order in quantities.

CRUCIBLES—Ohio P. Co. Ⓢ Porcelain glazed inside and out. Narrow form without covers.

Size, No.	000	00	0	1	2	3	4	5
Capacity about, cc.	5	10	15	25	57	95	155	280
Diam. about mm.	26	30	35	41	52	62	72	87
Height about, mm.	19	25	27	35	43	50	59	72
Each	$.10	.15	.19	.26	.36	.46	.51	.65

CRUCIBLE LIDS—Ohio P. Co. Ⓢ glazed throughout, for "B" form Crucible.

Size No.	000	00	0	1	2	3	4	5
Each	$0.06	.06	.06	.09	.09	.15	.16	.20

CRUCIBLES, GOOCH—Ohio P. Co. Ⓢ Porcelain, glazed inside and outside, with permanent perforated bottom, perforations ½ mm. in diameter.

No.	2	3	4
Capacity, abt. cc.	10	25	35
Diameter, abt. mm.	27	35	40
Height, abt. mm.	30	40	43
Each	$0.30	.40	.50

DISHES—Ohio P. Co. Ⓢ porcelain, with lip, No. 000–4 are entirely glazed; larger sizes are glazed inside, but only partly outside.

No.	000	00	0	1	2	3	4	5
Diam., outside, cm	6	7	8	8½	9	10	11	12
Capacity, cc.	35	50	80	100	140	175	210	300
Each	$0.15	.18	.21	.25	.35	.40	.45	.55

No.	6	6a	6b	7	8	8a	9
Diam., out., cm.	14½	15	16	18½	21	23½	25½
Capacity, cc.	385	400	500	650	1000	1250	1500
Each	$0.70	.85	.90	.95	1.20	1.76	1.90

LABORATORY WIRE AND SHEET METAL GOODS:

Triangles, typhoid and ophthalmia loops, animal cages, swab wires, inoculating needle, water baths, sand baths, culture tube racks and baskets, support stands, etc.

Ⓢ LABORATORY RUBBER GOODS:

Made of a very pure elastic stock which does not harden with age. Our stock includes: Tubing, Stoppers, Bulbs, and Culture Caps.

Ⓢ RUBBER STOPPERS. Our stoppers are made from the best Para rubber, and will not harden from age.

Either solid, one or two holes. Sold by weight only. Price.
per lb. $1.20

Table Showing Approximate Numbers of Rubber Stoppers to the Pound

Size No.		00	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Diam., large end, mm.		14	17	18	20	23	25	27	32	37	41	45	50	56	65	72
Diam., small end, mm.		9	12	15	16	18	20	23	26	30	33	37	42	50	59	68
Approximate Number in One Pound	Solid	120	80	60	55	42	33	28	20	15	12	11	8	6	5	4
	1 hole	130	90	65	60	45	35	30	21	16	13	11	8	6	5	4
	2 hole	138	94	70	64	47	38	32	22	17	14	12	8	6	5	4

"PERFECTION GLASS":

A very insoluble glass, of good strength and excellent thermal properties.

Beakers, Flasks, Culture Tubes, Test Tubes, Petri Dishes, Pipettes and all other usual forms. Any type of gas apparatus made to order.

HYDROMETERS:

Baumé Scale for light and heavy liquids; Specific Gravity Scale; Twaddle's Nos. 1, 2, 3, 4, 5 and 6, and all special instruments for acids, alkalis, alcohol, coal oil, gasoline, salt, vinegar, etc. Also Tralle instruments for wine and Brix scale syrup instruments showing percentage of sugar 0–90%. Small flat hydrometers for storage batteries.

Ⓢ MICROSCOPIC SLIDES:

Of clear flat glass. All slide well and uniformly ground. Put up in packages of one-half gross.

Ⓢ FILTER PAPER:

A pure, light, dense but rapid filter medium made in two grades in sizes 3, 4 and 5 inch circles, packed in boxes of 100 circles.

Grade "A"—for qualitative work.

Grade "A"—for quantitative work; double washed in Hydrochloric and Hydrofluoric Acids.

Exceptionally low in Ash.

Write for catalog and price-list. We solicit your inquiries and orders. We can offer exceptional opportunities for Quality, Service and Price.

LEHIGH FOUNDRY COMPANY

FULLERTON, PA.

Branch Office: 50 Church St. NEW YORK, N. Y.

PRODUCTS: Iron Castings of all description, made according to customers' specifications, up to fifty tons weight; Cylinders, Vacuum Pans, Condensers, Pump Castings, Rubbing Bed Plates for marble and slate plants, Scarifiers, Generator and Motor Castings, Drums, Cinder Ladles, Bases, Grate Bars, Engine Frames, Furnace Castings and Stokers.

LEHIGH FOUNDRY COMPANY'S PLANT, FULLERTON, PA.

SPECIALTY:

Castings of special mixture for the simultaneous resistance to heat and acid and chemicals, such as concentrating pans, retorts, fusing kettles, stills, autoclaves, salt cake pans, kettles, caustic soda pots, desilverizing kettles, decomposing pots, digestors, sulphate furnaces, acid eggs, blow cases and tanks.

LOCATION:

Situated in the heart of the iron producing section of the Lehigh Valley and in close proximity to coal mines and sand pits, gives this company a commanding position in the making of its products.

EXPERIENCE AND SERVICE:

Being in business since 1896 a knowledge and experience in the making of iron castings of all descriptions enables this company to produce its products economically and to give exceptional service to its customers.

FOUNDRY EQUIPMENT:

Ample oven capacity, large electric cranes, private tracks, large core shop and pattern shop all contribute to the expeditious execution of orders.

All castings are made according to customer's specifications, and the Lehigh Foundry Company is therefore not at liberty to illustrate or publish the various apparatuses and castings they manufacture.

A long series of experiments conducted in conjunction with acid and chemical manufacturers has enabled them to develop mixtures for the treatment of nitric, sulphuric, muriatic, acetic, hydrofluoric acids and fumes that has given a large patronage among the users of such equipment.

Studies are made of both the solution and temperature conditions and the mixtures arranged to meet the local conditions. These mixtures are intended for the simultaneous resistance to heat and acid or chemicals, and the success of the Lehigh Foundry Company in meeting these adverse conditions has given their mixtures an enviable reputation, both in the United States and Canada.

SULPHURIC ACID PANS:

Exceptional records have been made by Lehigh pans in this department of the chemical and powder trade. Their recovery pans are being used by practically all the larger firms in the United States and Canada.

CAUSTIC SODA POTS:

The Lehigh Foundry Company is prepared to offer records of the service their friends have been able to obtain from Lehigh pots in the treatment of caustic liquors. Their mixture for this purpose has been arranged so as to give maximum resisting qualities possible in this service, and providing against the danger of cracking under the variable temperature conditions to which these pots are subjected.

NITRIC ACID RETORTS:

A large assortment of sweeps and patterns for these vessels permit their manufacture in many instances without expense to customer for initial equipment.

One customer reported that Lehigh retorts installed in 1905 and 1907 were still in service at the time of this publication (1916).

MACHINE SHOP FACILITIES:

These include boring mills that will machine castings up to 17′ 5″ diameter x 10′ high, planer 6′ x 22′, radial drills, vertical and horizontal facing machines, large lathes, etc.

AMERICAN APPARATUS CORPORATION

Successors to Lenz & Naumann, Inc.

Manufacturers, Importers, Exporters and Dealers in

CHEMICAL, BIOCHEMICAL, MEDICAL, SURGICAL AND PHYSICAL APPARATUS AND SUPPLIES, — LABORATORY FURNITURE

9-11 East 16th Street, between Fifth Avenue & Broadway,
New York, N. Y.

Apparatus
"Made
in
America"

PRODUCTS: Laboratory Apparatus and Supplies.

THE LENZMANN-KOBER NEPHELOMETER AND COLORIMETER:

A new and improved instrument for either Nephelometric or Colorimetric Determinations. (Description and price upon request.)

THE RICHE ADIABATIC CALORIMETER:

(Pamphlet on Calorimetry and the use and usefulness of this apparatus just issued.)

This is the original and only Vacuum Calorimeter on the market. Accuracy, speed and ease of operation are its features.

THE LENZMANN ELECTRIC INCUBATOR:

Most reliable on the market.

THERMOMETERS:

Precision Instruments, Beckmann Thermometers, all kinds of Chemical Thermometers, etc.

HYDROMETERS:

Of all kinds and description.

BAROMETERS:

THE LENZMANN MICROMETER READING DEVICE:

For Thermometers, Burettes, etc.
Simple, reliable, accurate.

Lenzmann Insol Glassware of all description is **the** best glass made in America, to replace the **German Glass.** Look for the "Lenzmann Insol" mark.

It is uniform in shape and thickness, correct in weight; acid and alkali resisting.

Porcelain Ware of all description:

Crucibles,
Evaporating Dishes,
Buchner Funnels, etc., etc.

Filter Paper, best grades, white and gray, all sizes.

BALANCES AND WEIGHTS:

RUBBER GOODS FOR LABORATORY:

Pure Black Gum Rubber Tubing, Rubber Stoppers, etc., etc.

NITROMETERS:

CHEMICAL HARDWARE:

Supports, Clamps for Burettes, etc., Fasteners, Pinchcocks, etc., iron mortars, dishes, retorts.

LABORATORY CRUSHER:

PETERSON'S LABORATORY FURNITURE:

The best in the country; Cabinets, Tables, Hoods, etc. Complete equipments arranged for.

VENTILATING BLOWERS:

TIRRILL'S GASOLINE GAS MACHINES AND BURNERS:

LENZMANN SPECIALTIES:

Our new **Chemist Apron** (at $2.00 apiece) is recommended for the protection of the clothes.

The Lenzmann Field Cot is ideal, sanitary, used in the house, camp, or in the laboratory. It is a hospital utility; may be folded.

First Aid Outfit: The best, complete and most reasonable Cabinet on the market ($3.50).

All other requirements in our line are given careful attention.

Permanent Exhibit of the Best and Finest Peterson Laboratory Furniture at our showrooms, 9–11 East 16th Street, New York, this Company being the sole Eastern Distributor of Leonard Peterson & Co., Inc., Chicago, Ill.

LINK-BELT COMPANY

Manufacturers of

ELEVATING, CONVEYING and POWER TRANSMISSION MACHINERY

PHILADELPHIA CHICAGO INDIANAPOLIS

Branch Offices and Agencies:

New York: 299 Broadway
Pittsburgh, Pa.: 1501 Park Building
Boston, Mass.: 49 Federal Street
Buffalo, N. Y.: 698 Ellicott Square
Detroit: 732 Dime Bank Building
Cleveland: 1304 Rockefeller Building
St. Louis, Mo.: Central National Bank Building

Minneapolis, Minn.: 418 South Third Street
Seattle, Wash.: 580 First Ave., South
Los Angeles, Cal.: 161 North Los Angeles Street
Denver, Colo.: Lindrooth, Shubart & Co., Boston Bldg.
San Francisco, Cal.: N. D. Phelps, 461 Market Street
New Orleans, La.: C. O. Hinz, Hibernia Bank Building

PRODUCTS: Elevators and Conveyors for all materials; Coal and Ashes Handling Machinery; Screens, Crushers, Feeders, Water-Intake Screens; Locomotive Cranes, Drag Line Excavators; Coal Storage Systems; Grab Buckets; Elevator Buckets; Link-Belt and Sprocket Wheels; Transmission Machinery, Silent Chain Drives; Steel Roller Chains; Belt Conveyors, Bucket Carriers, Screw Conveyors, Electric Hoists; Wagon Loaders, Car Unloaders

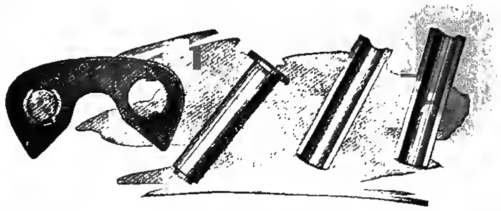
LINK-BELT SILENT CHAIN:

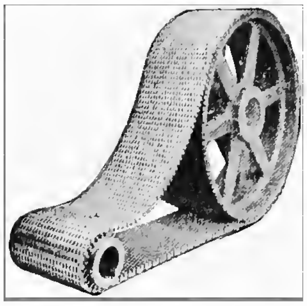
is the modern method of transmitting power, because it delivers without slip or loss; in hot, cold, damp or oily places, forward or reverse. It is 98.2% efficient on actual test, fits any conditions, reliable and easily applied. Built from ½ H. P. to 500 H. P. and over.

Look for the Name on the Washers
Look for the Liners in the Joints

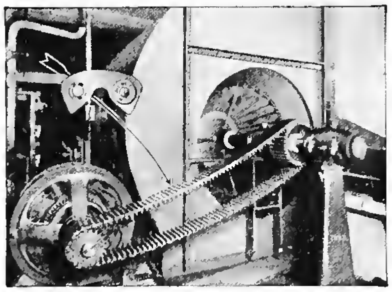
Flexible as a Belt—Positive as a Gear—More Efficient than Either.

Link-Belt Silent Chain is superior to leather or rubber belting because it cannot slip; it can be run on short centers; it can be used in hot, cold or damp places; it is run slack, and therefore without excessive journal friction; there is no dangerous sparking; it transmits power with less loss.

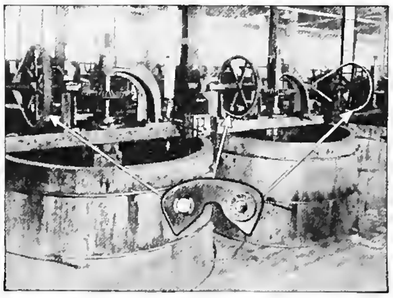

Details of Construction, Showing the Round Pin and Semi-Circular Steel Bushings



Link-Belt Silent Chain is superior to spur gearing because it operates quietly; it can be run at high speed; center distances can be arranged to suit conveniences of design; more teeth are in working contact; result: smoother action and less wear; self-contained bases are not necessary; with the same amount of power applied, it delivers more to perform useful work.


Fan Drive

Link-Belt Silent Chain is preferable to direct connection because in spite of its positive action, it introduces that very important element — elasticity; standard speed motors may be used, to operate mechanisms at most desirable rate; alteration in speed can be made at little expense; self-contained bases are not necessary; it offers greater economy and flexibility in the use of floor space.


A few of the 398 Link-Belt Chain Drives installed by the Schoellenkopf Aniline & Chemical Works, Inc., Buffalo, N.Y.

Link-Belt Data Book No. 125, our 112-page price list, is a handbook on efficient power transmission. It tells all about Silent Chain Drives, gives list prices, and tells how to figure drives. Consult it before planning new drives.

THE CHEMICAL CATALOG COMPANY, Inc.

Publishers of the Chemical Engineering Catalog

One Madison Avenue (Formerly 437 Fifth Avenue) **NEW YORK CITY**

PRODUCTS: The Chemical Engineering Catalog; Writers and Printers of Commercial Literature on Technical Subjects; Sales-Promotion Service for Firms desiring to reach Chemical Engineers and Buyers in the Chemical and Allied Industries; Free Information Bureau on all Catalog Data in the Chemical and Metallurgical Fields.

THE CHEMICAL ENGINEERING CATALOG:

The Chemical Engineering Catalog contains the condensed catalog data of firms who manufacture or handle chemical apparatus and machinery, laboratory apparatus and supplies and chemicals, raw materials and crudes of interest to those engaged in chemical work or in manufacturing products where chemistry forms an important part.

It was compiled under the supervision of Committees appointed by The American Institute of Chemical Engineers, The American Chemical Society and The Society of Chemical Industry, who felt that a reference work of this kind would be of great assistance to members of the Profession in looking up catalog data that has hitherto been difficult to refer to, owing to the lack of standardization of size and typographical arrangement of catalogs relating to chemical equipment.

The volume is indexed and cross-indexed in such a way that one may be quickly directed to any particular bit of information it contains. In this Index will be found the names and addresses of many firms who have not taken catalog space to describe or illustrate their goods, but who have furnished us with a list of products they handle.

FOR THE FREE USE OF REAL USERS:

The Chemical Engineering Catalog is *loaned,* not sold, without charge, for a period of one year (or until the issuance of another annual volume) to Chemical Engineers, Research Chemists, Plant Superintendents, Works Managers, Firms, Buyers and other individuals who may have legitimate need for a reference volume of this character.

HOW CATALOG SPACE-USERS BENEFIT:

The advantages to a manufacturer of having his products cataloged in a standard reference work of this kind, instead of separately in an individual catalog of his own, are many.

In the first place, individual catalogs have a way of getting lost. They are not used constantly as this volume will be used, and no matter how great an effort is made to preserve them, they will become misplaced.

The Chemical Engineering Catalog has the advantage of *permanency,* and, on account of the great variety of condensed and instantly available information it contains, will be kept on hand for constant reference. The information seeker will look to its pages *first* before going to his file of individual catalogs—provided he has been methodical and careful enough to preserve such a file—a thing which few chemical engineers or works superintendents can afford either the time or the money to do.

THE SAVING IN CATALOG COSTS:

In addition to the advantage of permanency and convenience that the Chemical Engineering Catalog has over the individual catalog, it has a further advantage in cost. The cost of compiling and distributing eight thousand catalogs is, page per page, cheaper when included in this volume, than when printed and circulated separately. Moreover reprints can be obtained at a low cost to take care of distribution not covered by the Catalog and to provide for extra copies in the office.

Manufacturers should remember that they are getting FREE DISTRIBUTION. The cost of compiling, printing and circulating eight thousand sixteen-page catalogs, for instance, when the cost of postage, envelopes, mailing, etc., is taken into account, is practically as great as the cost of using the same amount of space in the Chemical Engineering Catalog. And the Chemical Engineering Catalog will be permanently on file in at least eight thousand offices of chemical engineers, research chemists, industrial plants, etc., while over 50 percent. of the 16-page, individual catalogs will have reached only the waste basket.

We are aware that these statements regarding *costs* are open to argument, but we will take pleasure in presenting the facts to any manufacturer who desires to discuss the matter with us.

ADVERTISING SERVICE:

Our editorial and printing departments are at all times at the service of our clients in the preparation and manufacture of their catalog and advertising literature. When they require assistance in writing and preparing their catalog data for this book, we will make no charge for our services. Owing to our intimate knowledge of the chemical filed, and to the work being in charge of editors fully conversant with the technicalities of industrial chemistry, we can render satisfactory service of this nature augmenting that of the advertising agent, to whom we are also prepared to act in an advisory capacity regarding technical and engineering clients. When they call upon us in the preparation of advertising matter for other purposes, we shall charge a reasonable fee which will always be stated in advance.

OUR FREE INFORMATION BUREAU:

This Bureau is maintained for the convenience of those desiring catalog data that is particularly hard to obtain, and, also, to take care of any omissions in the Catalog. This department is under the direction of a Chemical Engineer. Inquiries whether by mail, telephone or personal call will be carefully and quickly dealt with. For further particulars see page nine in the front of the book.

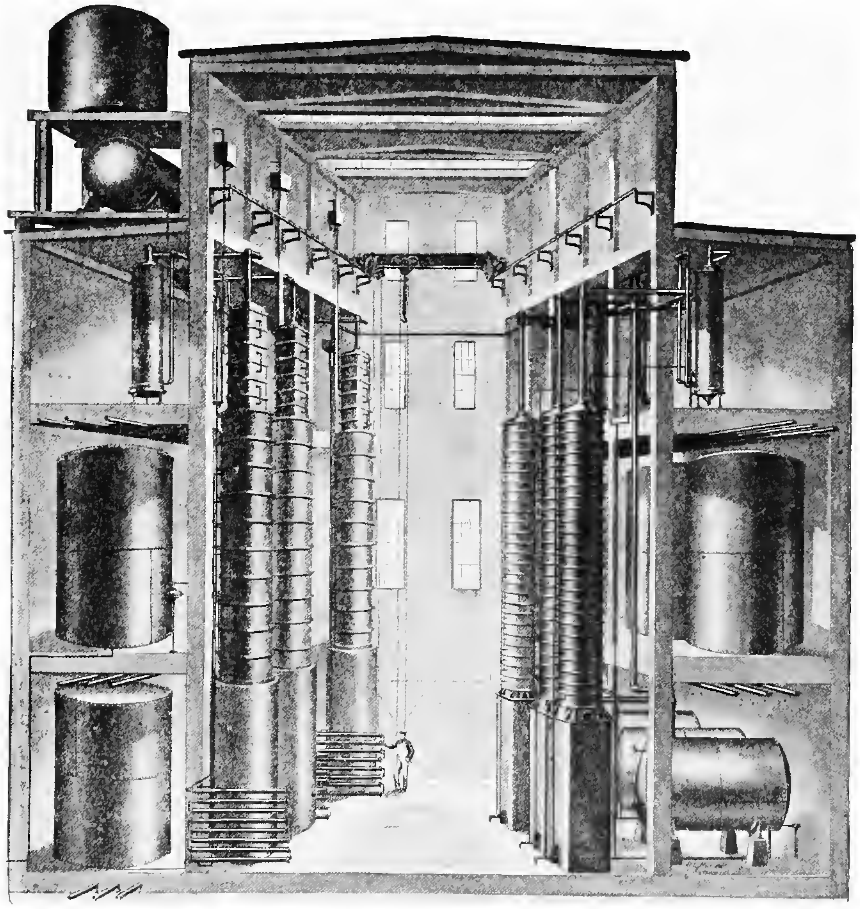
THE WALTER E. LUMMUS CO.

Manufacturers of

CHEMICAL DISTILLING & REFINING APPARATUS

Works: EVERETT, MASS. 173 Milk Street BOSTON, MASS.

PRODUCTS: Stills, Evaporators, Refining and Rectifying Apparatus and Plants for Volatile Liquids; Extracting and Dissolving Apparatus; Condensing, Cooling and Heat Exchanging Apparatus; Complete Plants for Recovery and Refining of By-products of Coal, Wood, and Petroleum Distillates; Recovery of Volatile Solvents by (A) Condensation from Air Mixtures; (B) Distillation from Solutions; (C) Evaporation from Absorbing Mediums; Towers for Washing Gases or Vapors; Absorbing Gases or Vapors; Diffusing Gases or Vapors; Accessory Apparatus for Measurement and Control of Temperature, Pressure and Flow of Gases, Vapors and Liquids; Apparatus for Transfer of Corrosive and Inflammable Liquids; Intercommunicating Piping Systems for Refineries; Overflow and Vent Systems for Inflammable Liquids.



COMPLETE PLANTS DESIGNED WITH FULL REGARD FOR COMMERCIAL ECONOMY OF OPERATION

ENGINEERING AND CONSTRUCTION STAFF:

To design chemical plants or simple apparatus groups—or even single pieces of chemical apparatus successfully calls for men who are familiar with the commercial production of chemical products. Mere chemical or engineering knowledge alone is not sufficient.

Each member of our engineering and designing staff has previously been in charge of actual chemical plants in the capacity of engineer, superintendent or works manager. Our construction staff has been drawn from manufacturing establishments, coppersmithing and steel plate works, foundries and machine shops,—a group of practical and energetic men who combine skill, experience, and judgment; and they accomplish results.

SCOPE OF SERVICES:

Design and construction of principal apparatus and accessory equipment for manufacturing or refining solvents, ethers, alcohols, naphthas, by-products of wood, coal or petroleum distillation. Design and construction of refineries, solvent recovery installations, and other complete chemical plants.

Our services consist not merely of the mechanical production of apparatus, but of its proper design, arrangement and balance—to make possible the commercial success of the projcct.

FACILITIES:

Our Everett factory is well equipped for manufacturing parts requiring special skill not otherwise obtainable. This applies particularly to heaters, controlling devices, and other units, involving patented features demanding close personal supervision. Here also we assemble and test our larger apparatus prior to shipment.

We have acquired dependable connections with foundries, machine shops, coppersmiths and steel plate builders resulting in extensive and elastic facilities as required for the manufacture of our unusually diversified line of products.

Our engineering and manufacturing branch at Montreal facilitates the execution of Canadian business along the same efficient and economical lines that have been developed in the States.

This predetermined manufacturing policy has been tested and proven adequate by the unusual and variable demands of the present abnormal activity obtaining throughout the chemical industry.

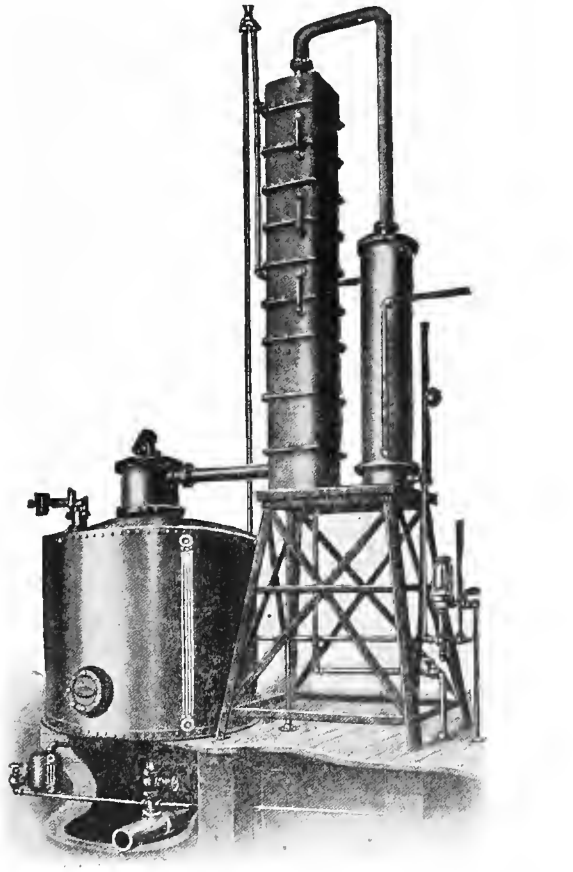
Continued on Next Page

PLAIN STILLS:

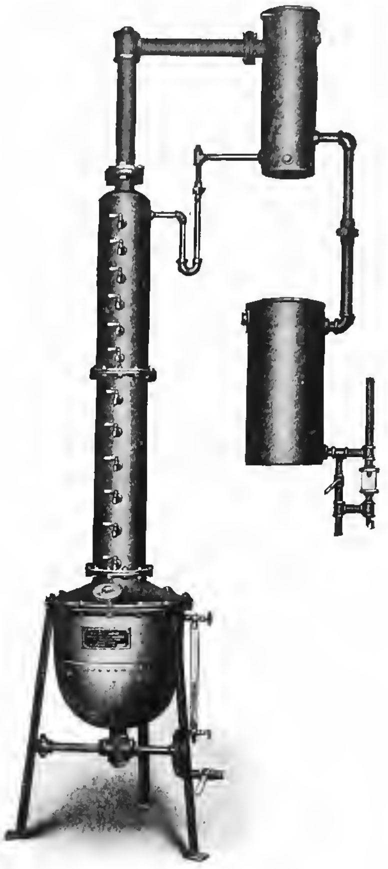
Are used mainly for the rough separation of volatile from less volatile liquids or from non-volatile liquids and solids. We supply such stills upright, horizontal, pressure and vacuum types, heated by steam coils or jackets, injected steam or direct fire.

COLUMN STILLS:

Are designed to separate mixtures of volatile liquids, also to concentrate volatile liquids from dilute solutions. They are especially adapted to operations in which it is desired to meet exacting specifications of quality or purity with a minimum operating cost. They are frequently referred to as refining or rectifying stills. Their efficiency as distinguished from plain or pot stills resides chiefly in the design of the rectifying or fractionating column which consists of a series of connected distilling chambers in which the complicated operations of fractional distillation takes place automatically and simultaneously. The number of chambers employed corresponds approximately to the number of fractions that would be produced if the same fractionation were attempted with a plain or pot still. The Lummus distilling columns are built up of unit sections embodving groups of like distilling chambers that may be assembled in any number required for the material to be handled and the quality of product desired.



LUMMUS PATENT RECTIFYING STILL, INTERNAL REFLUX SYSTEM



STANDARD RECTIFYING STILL, DEMONSTRATION SIZE

Column stills are roughly divided into two classes, non-continuous and continuous. The non-continuous or batch column stills have long been widely employed in Europe and America for divers well recognized standard types of design. Continuous column stills though of almost equal antiquity of invention have come into general use only of recent years through recognition of their superior economy and uniformity of production. While both types can be applied for many similar purposes, it is generally recognized that non-continuous stills are best suited for operations that are irregular in kind or quantity and for use where the same still must be employed for a variety of purposes. The continuous stills, on the other hand, though less flexible in respect to the range of materials or products to which they are adapted are much more economical of steam or fuel and are practically automatic in operation. Consequently they are more profitable for service that must be uniform in respect to quantity and quality of products and especially where large quantities of material must be refined at minimum operating cost.

Continued on Next Page

COAL TAR AND GAS PRODUCT DEPARTMENT:

This Company furnishes standard apparatus and equipment for recovering and refining:

Tar and Pitches
Ammonia
Light Oils
Direct Ammonia
Direct Benzol
Naphthas, Oils and Grease

Also:

Benzene
Toluene
Xylene
Carbolic Acid
Solvent Naphthas
Cresols
Middle Oils
Pure Phenol

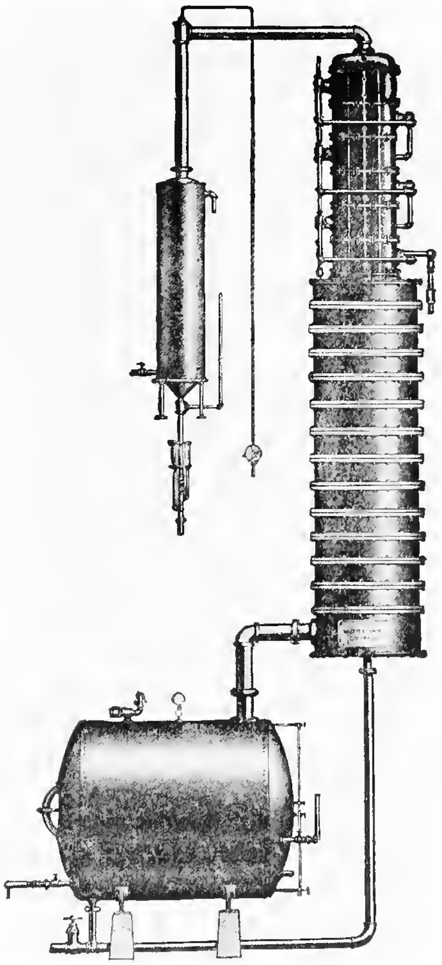
For this and similar purposes we supply:

Standard tar stills, condensers, tanks, and full equipment. Standard continuous ammonia stills, with condensers, lime tanks, and equipment.

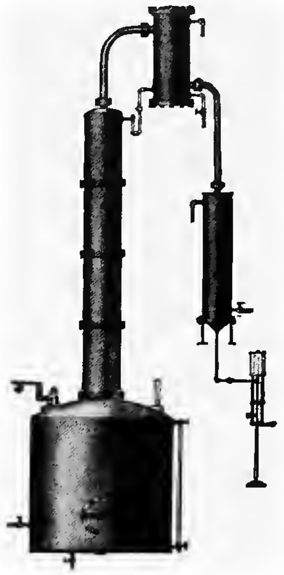
Standard refining stills for benzole, toluol, etc.

In addition to the standard types of apparatus above mentioned, we have anticipated the demand for apparatus capable of turning out products of higher and more uniform purity, larger yields, and lower cost. These advantages are embodied in our special types of apparatus enumerated below:

1. Lummus alkali washers and Lummus acid washers for washing light oils, benzols, etc.; to remove unsaturated compounds.



BENZOL REFINING STILL



STANDARD COLUMN STILL EXTERNAL REFLUX

2. Lummus continuous tar stills for producing soft pitch with light oils or total oils up to temperature limits.

3. Lummus direct benzol absorbing and condensing equipment for obtaining benzol by absorption from coke oven and similar gas mixtures.

4. Lummus direct ammonia absorbing outfits combining absorption tower, and continuous recovery still.

5. Lummus continuous ammonia concentrating stills for concentrating ammonia from weak liquors.

6. Lummus benzol and toluol rectifying still for producing benzol pure and toluol pure suitable for nitration, etc.

7. Lummus complete refining equipment for benzol, toluol, etc., including stills, tanks, piping, and auxiliary equipment for either continuous or intermittent operation.

8. Lummus mono-chlor-benzol plant including nitrators, chlorinators, de-hydrators, concentrators, refiners, and complete system of recovery of unaltered benzol.

9. Lummus benzol and toluol recovery plant for recovering solvents that have evaporated in confined air.

10. Lummus re-crystallizing plants, closed or open circuit, for refining TNT and similar products.

CRACKED PETROLEUM DEPARTMENT:

This company is building complete equipment for recovering and refining products of the Rittman and kindred processes, operating on low grade petroleum or paraffin or asphaltic base or both, and for the manufacture of gasoline, benzene, toluene, xylene, etc. Extensive plant recently furnished embodies highly developed and methodical practice simplified to the limitations of isolated plants. Economical conversion, large yields, low operating cost accomplished by our complete plants or separate units of apparatus including heat economizers, purifiers, washers, and evaporators for the removal of sulphur impurities.

Continued on Next Page

WOOD CHEMICAL MANUFACTURES:

The return of normal business conditions is fairly certain to result in a decline in market prices of wood chemical products partly through diminished consumption and partly through the competition of other products that can be substituted at a price.

It is equally probable that costs of manufacture will, at the same time, stand at a record high point and stubbornly resist reduction except by the substitution of improved and more economical methods.

Now since the profit of the wood chemical manufacturer lies between the cost and selling price of his products, he must either maintain prices or reduce cost or submit to the loss of profits.

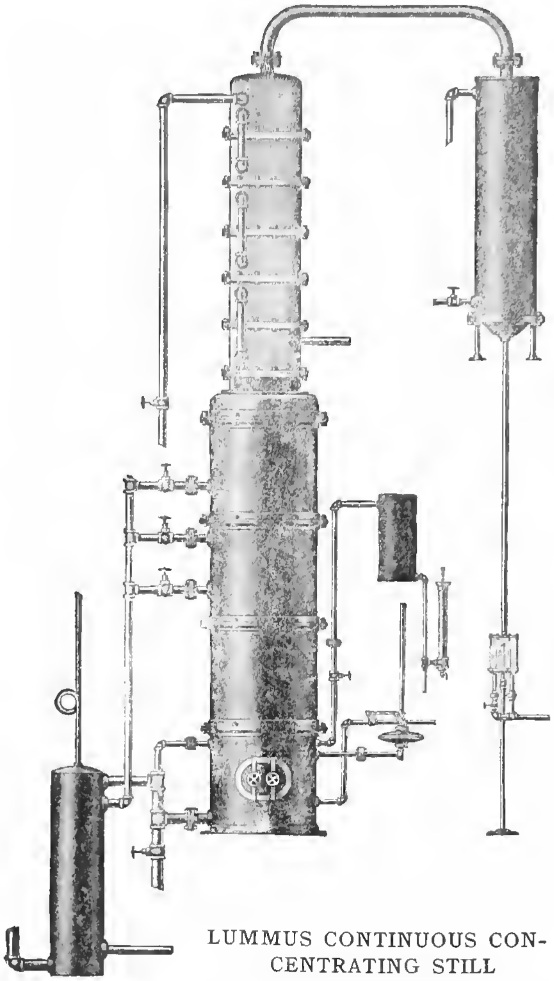
But consumption and market prices are scarcely within the control of the manufacturer so the only practical solution of his problem is to reduce manufacturing cost.

Fortunately improved methods and apparatus have been developed and are available for cutting down some of the largest and most burdensome expenses.

The improved wood chemical apparatus developed by The Walter E. Lummus Co. with the advantage of some 20 years of practical experience in this industry, embodies important economies of fuel, labor and repairs which combine to effect a large saving of manufacturing cost together with important increase in yield and value of products.

Single units or complete lines of the following improved types can be furnished.

Lummus Charcoal By-Product Ovens.
" Raw Liquor Evaporators.
" Lime Lee Stills.
" Crude Alcohol Concentrators.

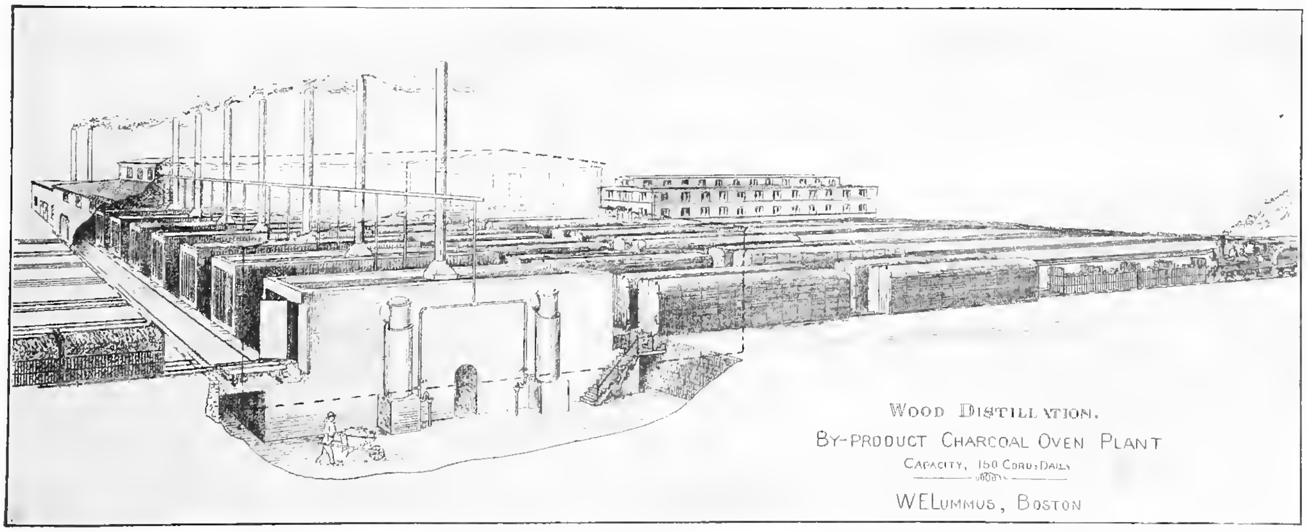


LUMMUS CONTINUOUS CONCENTRATING STILL

We also manufacture continuous and batch stills and equipment for the manufacture of:

Refined Wood Alcohol.
Acetic Acid.
Formaldehyde.
Pure Methyl Alcohol.
Acetone.
Chloroform.

Complete Refineries and refining outfits.



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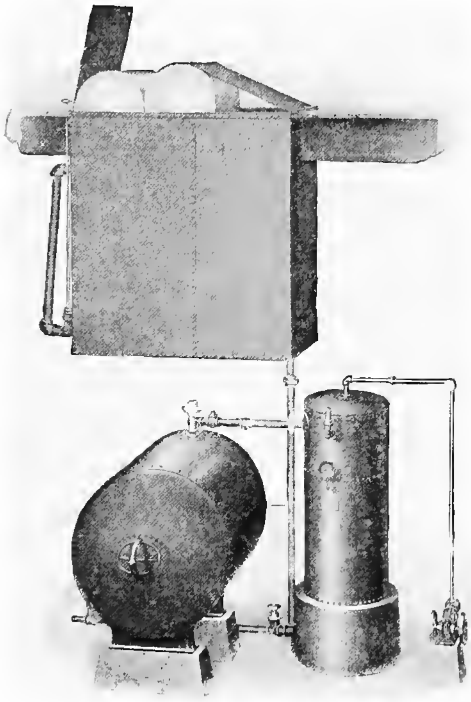
DISSOLVING APPARATUS:



AUTOMATIC CAUSTIC SODA DISSOLVER

In many industrial establishments the cost of preparing standard solutions of caustic soda, salt, bichromate, alum, sugar, and other dry soluble materials runs into figures never appreciated by the management. This is especially true if water must be heated, the materials weighed, and labor and power expended to produce solutions of materials, notwithstanding they may be readily soluble in water or other solvents.

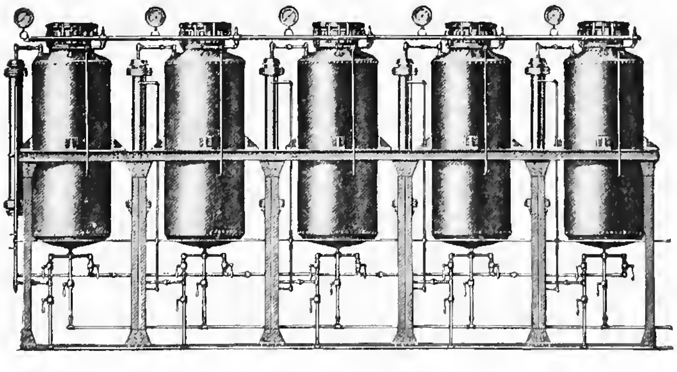
The Lummus Dissolving Apparatus is designed to reduce the work and expense of dissolving to a minimum by taking advantage of certain properties of solutes not generally recognized, by which they will themselves furnish most of the energy for their own solution. This dissolver operates without steam either for heating or stirring and without danger of scalding or other accidents to the workers.

SPECIAL DISSOLVER FOR CAUSTIC SODA:

This apparatus handles whole drums, eliminating the dangerous and troublesome breaking up.

EXTRACTION APPARATUS:

It pays to extract thoroughly whether it be the recovery of a valuable product from waste material or the freeing of a desired fibre from objectionable oil or grease or to extract dyestuffs.



EXTRACTION BATTERY

The Lummus Continuous Series Extraction Battery provides the best and cheapest method for "building up" dilute solutions, obtained from partly exhausted materials, by contact with fresher material encountered by stages.

Arranged for continuous introduction of fresh solvent and discharge of concentrated extract; consecutive cutting out, dumping and recharging of cells and recovery of solvent by steam distillation, without interrupting the process.

For the manufacture of logwood, fustic, osage-orange, Brazil wood, and other dyes.

For copra, wood oil nut, and various press cakes.

For gums, resins, waxes, deresinating rubber, manufacturing rosin.

The Lummus Single Cell Extractor for batch operation employs the well-known Soxhlet principle with important modification in respect to efficient circulation as required for commercial conditions. Each unit is complete in its provision for rough extraction by solvent circulation, final washing by the Soxhlet method, concentration of the extract, and recovery of solvent from the spent material.

ABSORBING TOWERS:

ABSORBING TOWER

For scrubbing gases, for recovering solvents from air mixtures, for absorbing gases, producing saturated solutions when required, for condensing vapors by direct contact with liquor, for fixing volatile bodies by contact and reaction with chemical reagents. Lummus towers are designed for thorough atomizing of gases or vapors so as to insure complete contact with liquors, properly proportioned for most advantageous circulation of absorbing or scrubbing liquor and constructed of materials to withstand the chemical action of either the gas, vapor, or liquor involved. A noteworthy feature of our towers is their characteristic low back pressure, generally obviating the necessity of blowers or suction devices as usually employed.

These towers are used to advantage in many cases involving chemical reaction, for instance, in connection with de-nitrating processes. Our system of atomizing and thorough circulation of both gases and absorbing medium results in complete admixture with air and water vapor or whatever other reagents may be involved, so as to produce maximum recovery with minimum amount of absorbing medium or reagent.

CONDENSERS:

Condensers for alcohol, ether, benzol, etc., unlike those for steam, must COOL as well as condense in order to make complete recovery.

Lummus Condensers provide large surfaces properly proportioned for efficient condensing and cooling so that recovery is practically complete even in the case of highly volatile liquids.

These condensers are economical of water and are provided with removable jackets and heads to permit convenient cleaning of both inside and outside tube surfaces.

Continued on Next Page

SERIES HEAT EXCHANGER

APPARATUS ACCESSORIES.

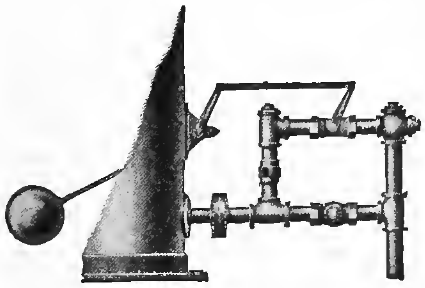
In descriptions of processes which we read in technical treatises we so frequently read "The liquor should after heating be fed at a uniform rate to the apparatus, the process should be watched and frequently tested, the discharge must be uniform both as to rate and quality." These conditions are so obviously desirable that they are recognized and accepted without question, but when it comes to preparing the plant for operation, how will such conditions be accomplished?

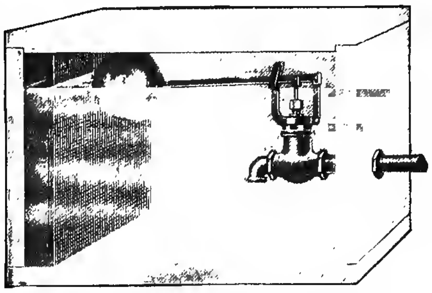
HYDROSTATIC PRESSURE REGULATOR

To pre-heat feed liquor carefully may not be difficult if abundant steam be used, but to do it economically calls for a heat exchanger that will abstract the heat from the product or waste liquor to be cooled, and transfer this heat to the incoming feed liquor.

Where uniform pressure is required in the case of stills or evaporators a pressure regulating and compensating device is required. This device to be most useful must be actuated by or respond to the variable pressure itself. In many cases this variable pressure is very low and subject to changes that are measured in ounces. We have patented devices of high sensitivity, self-contained, and positive in action that provide accurate control under these extreme conditions.

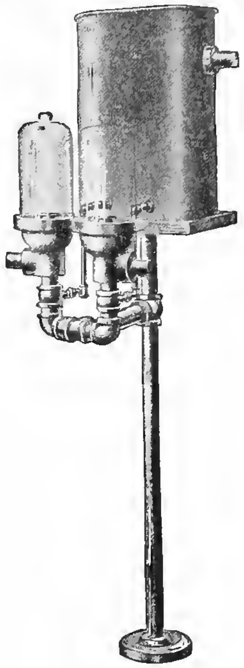
Feed regulators that require no watching, that do not forget, that do not hesitate to work 24 hours per day for weeks and months are invaluable. Years of difficulty brought about by lack of reliable feed regulators have led to the development of simple and effective devices exactly suited to the needs of chemical refineries.


CONSTANT DISCHARGE REGULATOR


CONSTANT FEED REGULATOR

We provide well designed and properly guarded sight glasses that admit ready inspection, and are applicable to all cases where it is essential to observe the flow of liquid without the usual distracting noise and inconvenience of splashing. Our testers are employed to abstract samples without interrupting the process. Samples may be drawn under pressure conditions or from a vacuum.

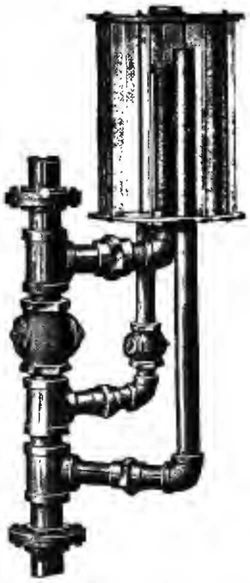
With continuous operating apparatus the discharge of tailings must be regulated to provide against backing up within the apparatus or release of pressure due to unsealing of outlets. A reliable discharge regulator is demanded. Our type is positively operated by the varying liquor level and includes ample provision for inspection and adjustment.


TAILS TESTER

Where a liquid product finally issues from a process it must be possible to time the flow, take its specific gravity, observe its color, temperature, and other characteristics, all without exposing the liquid to the atmosphere. Hence the Lummus Measuring Product Gauge—adaptable to any liquid.

The Lummus System of Intercommunicating Liquor Piping for Refineries is effective in avoiding mistakes and consequent financial loss due to mixing refined with crude liquors. The flexibility of this system removes the usual limitation of a plant to one set process and leaves the way open for future modification.

Our Overflow and Vent System for inflammable liquors provides for the safe handling of such uncertain materials as benzol, toluol, gasoline, acetone, etc. Overflow and explosive vapor-air mixtures are thus avoided with consequent lessening of danger to lives of operatives and lower insurance rates.

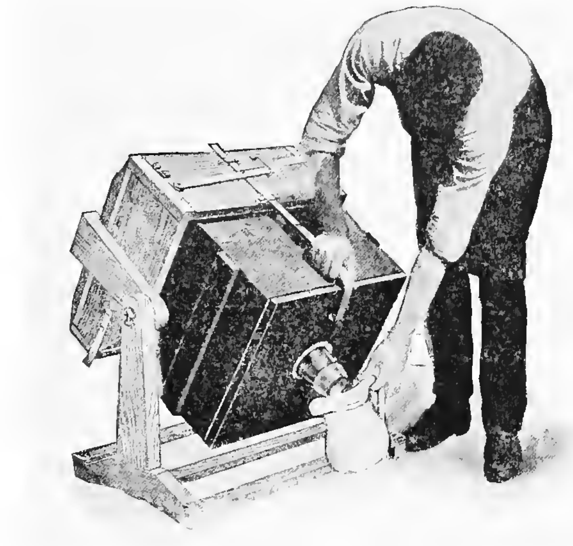

PRODUCT GAUGE

HORACE M. McCORD & COMPANY

INCORPORATED

890 Lumber Exchange **MINNEAPOLIS, MINN.**

PRODUCTS: Carboy Inclinators.



ONLY ONE MAN—SAFETY

ADVANTAGES OF THE UNION CARBOY INCLINATOR:

The superiority of the Union Carboy Inclinator depends on the following facts:

It turns on its own axis, requiring no floor space in which to roll or travel which is a great advantage in crowded quarters. It has a safety lock.

If accidentally released while pouring, the carboy will automatically return to upright position.

The bottom of the carboy, the part most liable to give way in an old carboy, is supported by the floor of the box of the Union Inclinator. This is a feature no other inclinator offers.

The Union Inclinator is 90% of wood construction.

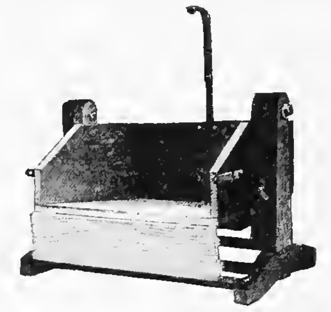
It can be operated quickly and with absolute safety by one man. It is a protection against loss resulting from broken carboys, not only of the fluid itself, but stock which may be damaged through contact with the acid, ammonia or other fluid.

Without an inclinator it requires the work of two or three men to handle a carboy in pouring, all of them being liable to injury in case of an accident. It is not wise to run the risk of liability for acid burned employees when a device of this kind can be secured at a low cost. The Union Carboy Inclinator was passed by the Jury of Admission for Exhibition in the American Museum of Safety, New York City.

The Union Inclinator will hold any size carboy in commercial use.

USES:

The Union Inclinator is specially adapted for use in Chemical Factories, Dyers' Establishments, Textile Mills, Paper Mills and Coating Mills, Pharmaceutical and Medical Supply Factories, Storage Battery Plants, Plants for Manufacture of Aniline Dyes, Research and Analytical Laboratories, Testing Stations and in fact everywhere where liquid chemicals have to be handled in quantity.



DROP GATE DOWN TO RECEIVE CARBOY

GUARANTEE:

If the Union Inclinator fails in any respect to give satisfactory service it may be returned at our expense.

CARBOY INSTALLED

PRICE:

The Union Carboy Inclinator sells for $7.50 each in the United States and Canada. 5 per cent. discount in lots of 6. Write for quantity prices. Weight 60 lbs. K.D. and crated. Since the inclinators weigh but 60 lbs., two inclinators ship for about the same freight as one.

The Union Inclinator is patented in U. S. and Canada.

MacKINNON, HOLMES & COMPANY, Ltd.

Engineers, Contractors, Manufacturers

Head Office and Works

Drummond Street
SHERBROOKE, P. Q., CANADA

PRODUCTS: Autoclaves, Acid Tanks, Bins, Bridges, Boilers, Buildings, Cars, Chutes, Cranes, Coolers, Charcoal Furnaces, Causticizing and Condensing Tanks, Defecators, Elevators, Evaporators, Mine Cars, Oil Tanks, Ore Buckets, Penstocks, Smokestacks, Stills, Sugar Refinery Apparatus, Structural Steel and Plate Work of all kinds for the Chemical Industries.

SERVICES:

Drawings, Specifications, Estimates and Reports for Foundations, Dams, Piers, Walls, Structural Steel and Steel Plate Work, including complete Chemical, Electrochemical, Explosive, Pulp and Paper, Sugar Refining, Acid, Alkali and other plants.

FACILITIES:

We have one of the most modern and complete plants in America for handling both structural steel and steel plate work, and combining the two lines. We carry a heavy stock of materials, such as beams, channels, angles, universal mill plates, sheared plates, bars, etc. We are thus in a position to handle work in the following lines:

TANKS FOR CHEMICAL INDUSTRIES:

Tanks of all kinds for the chemical industries, acid and explosive works, tanneries, pulp and paper mills, etc. Our work in this line is in accordance with the most modern engineering practice, both design and workmanship being first class and the job in every respect a finished one. These tanks include storage tanks, mixing tanks, pressure tanks, warming tanks, dissolving tanks, bins, chutes, hoppers, etc.

SUGAR REFINING INDUSTRY:

Syrup tanks, defecators and other sugar refinery material.

WOOD DISTILLATION PLANTS:

Coolers, ovens, charcoal furnaces, stills, condensers, tubs, steam pans, etc., trucks.

PULP AND PAPER MILLS:

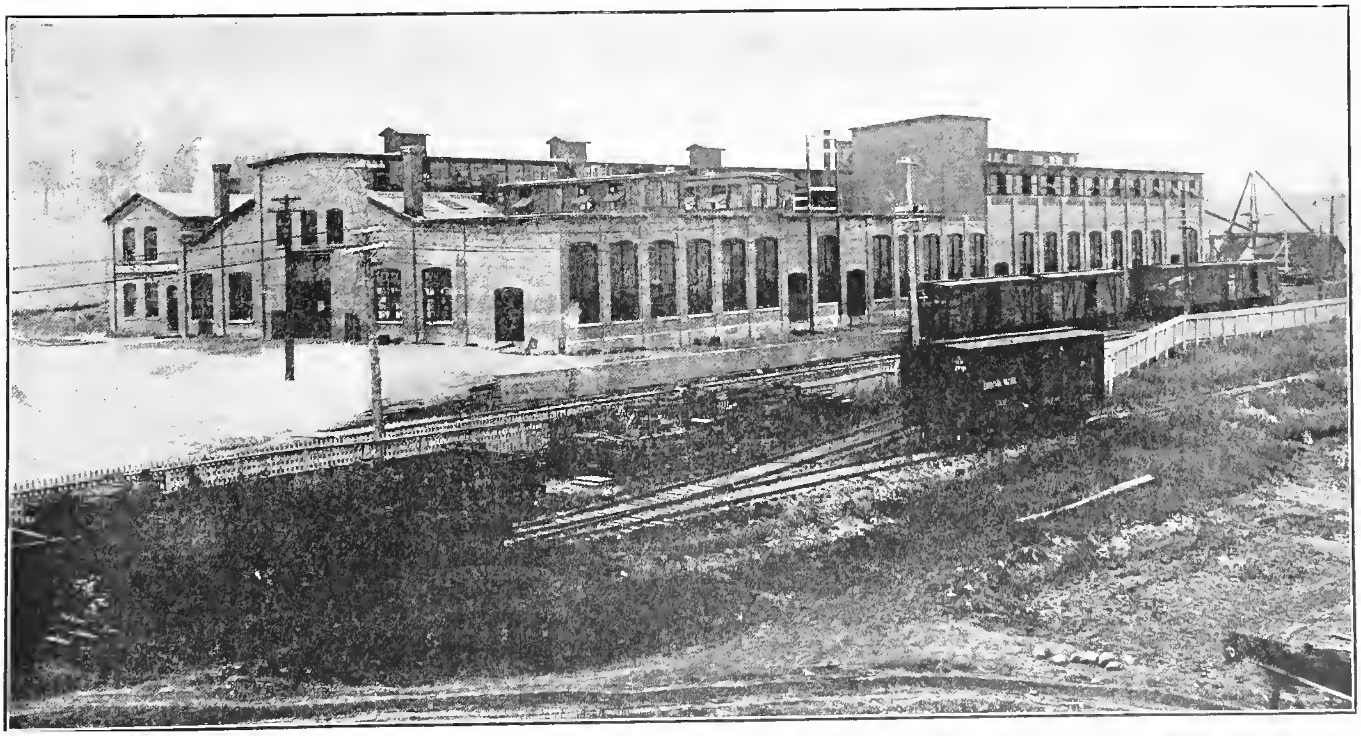
For this important industry we are prepared not only to supply the details of equipment, such as diffusers, causticizing tanks, mixing tanks, special acid tanks, filter tanks, etc., but also to undertake the erection of all the structural steel and steel plate work necessary for a complete plant including penstocks and draft tubes for water-power development, which is so frequently required for pulp and paper projects.

GENERAL STRUCTURAL WORK:

We are well equipped to erect structural steel work such as highway and railroad bridges, columns, roof trusses, coal bunkers and supports, towers, trestles, etc., in any part of Canada or Newfoundland.

GENERAL STEEL PLATE WORK:

We design and erect bin linings, refuse burners, smokestacks, boiler breachings, coal conveyors, water-power development equipment and almost anything in steel plate work.



M E R C K & C O.

ST. LOUIS NEW YORK MONTREAL

Main Works at RAHWAY, N. J.

PRODUCTS: Reagents. Also a Full Line of Chemicals for Technical, Medicinal and Photographic Purposes.

REAGENTS:

Every chemical test you make depends upon your reagents. This places a responsibility on you at the very outset. You want proper reagents. It is a universal demand and one that must be satisfied. For many chemists the question is already settled; the demand is satisfied; they have unloaded the responsibility on us, and their tests are consequently made satisfactorily. They use Merck's Blue Label Reagents.

STANDARDS:

Merck's Blue Label Reagents are manufactured and tested in accordance with a set of *fixed* standards and *fixed* methods of testing. The standards themselves and also the methods of testing have been published many years. They are available in permanent book form the same as any other established data on chemistry. Several editions and revisions with additions and improvements have already been published, and the book has found use in many countries. It is printed in several languages.

CHEMICAL REAGENTS:

Their Purity and Tests (1914) (D. Van Nostrand Co., New York. Price $1.00) is the book of standards for reagent chemicals. It may safely be said that this is the only collection of Standards and Tests for reagent chemicals that is authoritative. It has stood the searching scrutiny of chemists throughout the world for more than twenty-five years. How many chemical books survive such treatment for such a period? Think it over. It means a great deal. By this set of standards, hall-marked by time, but *always revised to date*, judge Merck's Blue Label Reagents. Your reagents should conform to these standards. Better can not be had.

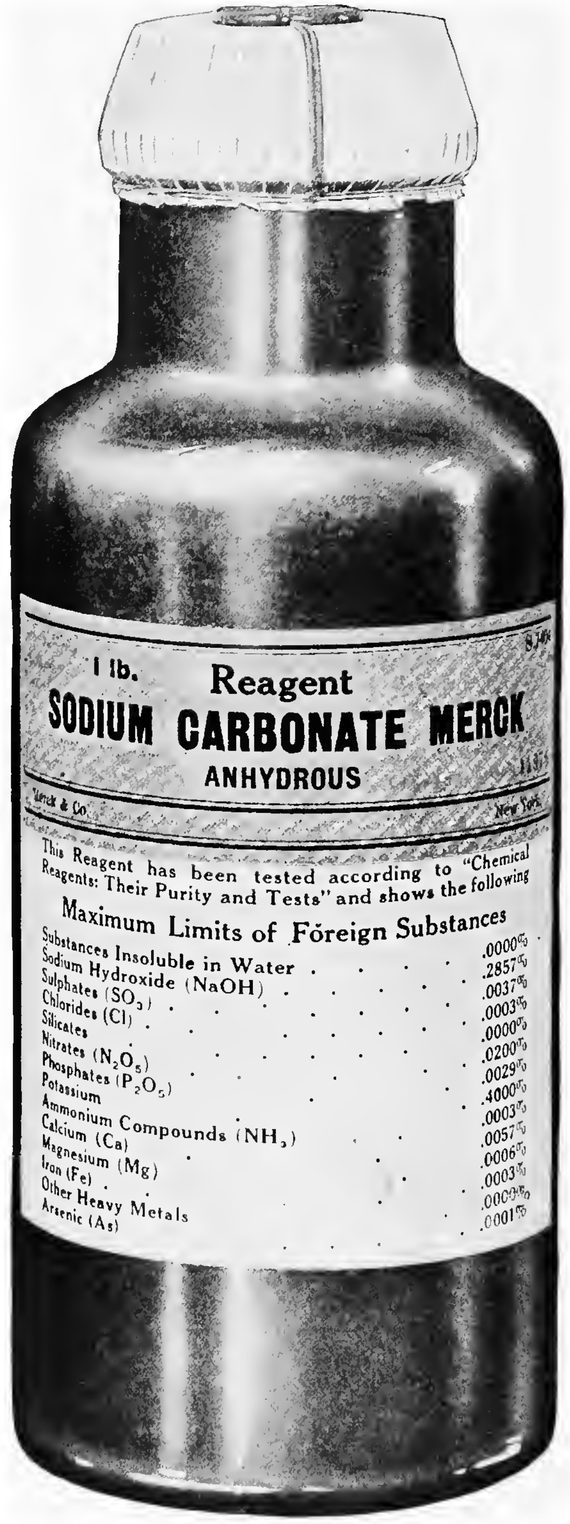
LABELS:

For your especial convenience we put Blue Labels on these Reagents. You need only ask your dealer for Merck's Blue Label Reagents.

The label is descriptive and full. It contains a statement of the maximum impurities that the goods are allowed to carry, popularly known as the "Analysis on the Label." The figures are those published in the book of standards referred to above, and are subject to change only as the book is revised. They thus carry weight and can be relied upon.

INFORMATION:

We are always glad to furnish information about our Reagents, and, indeed, about all our products. A postal card request will bring you a free copy of an attractive booklet descriptive of our Reagents. All tests of purity for Reagents are given in a concise form, and hundreds of uses for the Reagents are also included in the text. The tests of this little book will also be of real service to you in examining chemicals of *any* grade as to their purity.



This Reagent has been tested according to "Chemical Reagents: Their Purity and Tests" and shows the following

Maximum Limits of Foreign Substances

Substances Insoluble in Water	.0000%
Sodium Hydroxide (NaOH)	.2857%
Sulphates (SO_3)	.0037%
Chlorides (Cl)	.0003%
Silicates	.0000%
Nitrates (N_2O_5)	.0200%
Phosphates (P_2O_5)	.0029%
Potassium	.4000%
Ammonium Compounds (NH_3)	.0003%
Calcium (Ca)	.0057%
Magnesium (Mg)	.0006%
Iron (Fe)	.0003%
Other Heavy Metals	.0000%
Arsenic (As)	.0001%

FACSIMILE OF BOTTLE WITH OUR *BLUE LABEL*

MOGUL COMPANY

Established 1893

A. GROTHWELL

Cable Address: "MOGULGRO"
New York

126 Fifth Avenue NEW YORK, N. Y.

PRODUCTS:

Preservative Paints and Compounds for Acid proofing, Alkali proofing, Water proofing, Insulating, (electrical and refrigerating), Fume proofing.

Materials for repair and maintenance.

Saturated Cloth 1″ to 108″ wide, Paper Fibre, Wickings, Sawdust, Cork, Asbestos, Brick, Sand.

Linings for Floors, Tanks, Shipping packages, Roofing.

Tanks, Trays, Sinks, Boxes, Vats, Containers.

"MOGUL" PRESERVATIVE:

All the Mogul products are free flowing fluids, always ready for use, no stirring or heat, applied with brush, dipping or spraying.

Conditions vary, therefore we supply such varieties as thick, thin, medium, waxy, hard, slow dryer and quick dryer, odorless results.

Thin saturates and penetrates and thick remains on the surface. Some grades cover 600 to 700 sq. ft. to the gallon on metals, on wood 400 to 500, and cement brick and terra cotta 250 to 350 ft.

USES:

Treatment of overhead piping, wiring, metals, to prevent effect of fumes, exhaust fans, flues walls, floors, cables, apparatus, aprons.

In coal mining preventing absorption of moisture by overhanging slate, protection against dry rot in timbers of all mines, electrical wiring, mine piping.

We have timbers treated under ground twenty years, brick foundations and damp courses fifteen years, brick walls, sleepers and under side of flooring eight and nine years, toilet tanks with lining removed.

Acid purifying cement tanks for water works, flues, chimneys, reservoirs, table tops, buckets, metal piping, in cinder concrete.

Tanks to resist cyanide of potassium, hydrofluoric, hot copper solutions, acetic, sulphuric, nitric hydrochloric, muriatic, hyposulphate of soda, nitrate of silver, chloride of gold, ammonia, glycerine.

Resists chlorine gas and prevents electrolysis.

In processes where acids and alkalies are used, wherever work is to be protected against the action of chemicals and water.

Electro Chemical connections.

SPECIAL USES:

The Chemist and Chemical Engineer will find considerable interest in the use of Mogul in the following and other industries:

Acetylene
Acid and Alkali Works
Chemical Plants
Chlorination
Reduction
Smelting
Refineries
Breweries
Cold Storage
Ice Plants
Dynamite
Powder
Ordnance
Fertilizer
Glue Works
Rubber Industry
Photographic
Assaying
Copper Works
Paper Mills
Bleacheries
Dye Houses
Gas Works
Sugar Interests
Plating
Distilleries
Tanneries
Storage Batteries
Metallurgy
Electrolytic
Electro Chemical
Flumes
Iron Works
Ship Building (Lining Hulls)
Condenser Pipes
Cooperage
Belting

REFERENCES:

United States Government in several departments.
Prudential Insurance Co., Newark, N. J.
T. C. Marceau, New York, N. Y.
Tiffany Studios, New York, N. Y.
A. W. Penrose & Co., London, Eng.
Ketterlinus Litho Mfg. Co., Philadelphia, Pa.
R. H. Macy & Co., New York, N. Y.
Pacific Gas & Electric Co., San Francisco, Cal.
Crocker Estate Co., San Francisco, Cal.
Seaboard Realty Co., New York, N. Y.
J. W. Armstrong, Baltimore City Waterworks.
A. M. Hunt, Naval Consulting Board.
Richard Lamb, New York, N. Y.

CO-OPERATION:

Write us for information on any condition requiring protection before making your specifications.

SAMUEL L. MOORE & SONS CORPORATION

CRESCENT IRON WORKS

ELIZABETH, N. J.

Phone: 100 ELIZABETH

Cable Address: CRESCENT, ELIZABETH

PRODUCTS:

KETTLES

- Caustic Soda
- Color
- Crystallizing
- Fusion
- Jacketed
- Nitration
- Reduction
- Sulphonating

PANS

- Concentration
- Evaporating
- Salt Cake

STILLS

- Ammonia
- Nitric Acid
- Sulphuric Acid

MISCELLANEOUS

- Acid Eggs
- Filters
- Nitre Pigs
- Acid Strainers
- Flue Pipes
- Furnace Fronts
- Furnace Bars
- Regulus Metal Valves
- Retorts
- Pyrites Burners
- Autoclaves
- Impellers
- Lead Lined Fittings
- Still Bottoms

During the past few years when demands have been excessive, this corporation has kept its promises as to deliveries and maintained its reputation for superior work.

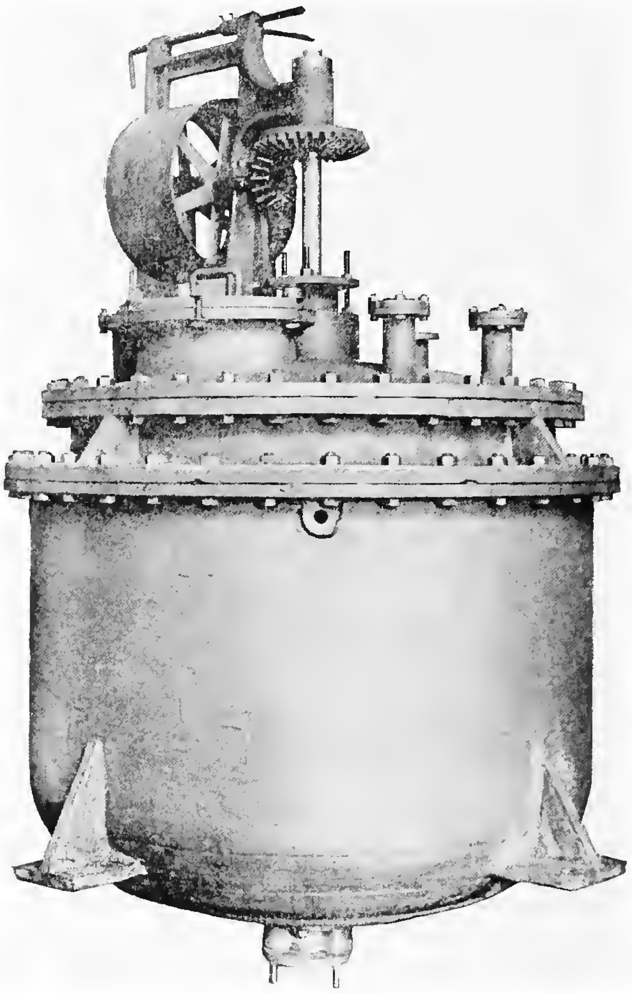
The iron mixtures for service under severe corrosive or heat conditions have "made good." Repeat orders offer best testimonials as to results.

The service rendered warrants confidence in the reliability of our products reducing to a minimum the loss of production due to breakdowns, rapid deterioration and failure of apparatus.

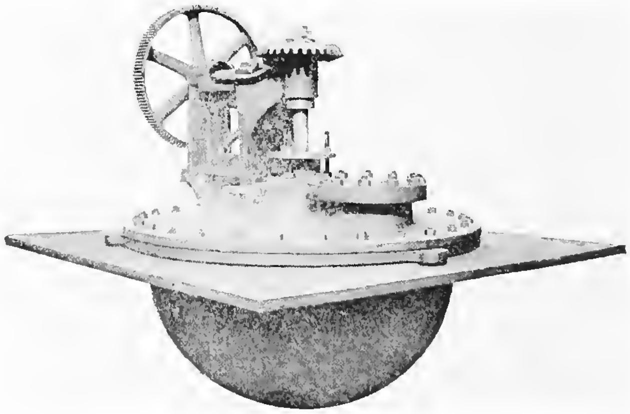
During the past year over One Million Dollars have been spent in plant extensions, which are now completed and in operation. The increased facilities enable the output of apparatus of any size, and a large volume of work may be produced at short notice.

Customers can rely upon our safe-guarding and treating as confidential all drawings and details furnished by them.

Designs and quotations will be submitted on receipt of customers' specifications. Our Engineers are at the command of our patrons for consultation or advice.



NITRATION KETTLE



FUSION KETTLE

MORGAN CONSTRUCTION COMPANY

Gas Producer Department

WORCESTER, MASS. **Cable Address: MORGAN**

PRODUCT: Morgan Producer-Gas Machine.

DESCRIPTION:

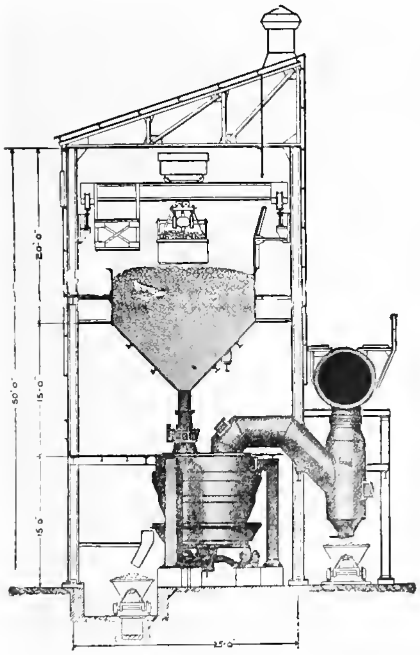
The Morgan Producer-Gas Machine converts a larger quantity of coal than is possible with any other type of mechanical gas producer, into gas of the best known quality, without disturbance of the fuel bed and without manual labor.

OPERATION:

A measuring feeder delivers coal of any size up to four-inch cubes, direct from the overhead bin on to the fuel bed at frequent intervals, without action on the part of the operator, whose work is confined to regulating the speed to correspond with the demand for gas. The coal is properly spread and the surface continuously leveled by the leveler which floats on the fuel, and permits any practicable variation in height of surface.

Ash is removed mechanically at one point into a conveyor by a spiral-shaped plow, held stationary during one complete revolution of the ash-pan, and then released automatically.

The development of a closed feeder, operating without manual action, together with the other improvements noted, makes it possible for one man to attend to the gasification of nine tons of coal per hour.



INSTALLATION MORGAN GAS PRODUCER

OPERATING RESULTS: ECONOMY:

In one plant of a leading steel company four units were installed to do the work usually requiring six mechanical producers. During a period of four months three machines produced all the gas, working at an average rate of over 30 tons coal per day. Continuous twelve-hour samples of the gas were taken day and night for several weeks with the following results:—

AVERAGE ANALYSES OF 12-HOUR CONTINUOUS GAS SAMPLES

Date	CO_2	C_2H_4	CO	H_2	CH_4	B. T. U. of Gas	
						U. S. Steel Standard	Total at 32° Fahr.
Feb. 2– 7, 1914	2.8	0.6	27.4	11.4	3.6	162.0	182.5
Feb. 9–14, 1914	2.8	0.6	27.3	11.1	3.4	159.0	179.0

QUANTITY OF COAL GASIFIED IN CONTINUOUS OPERATION

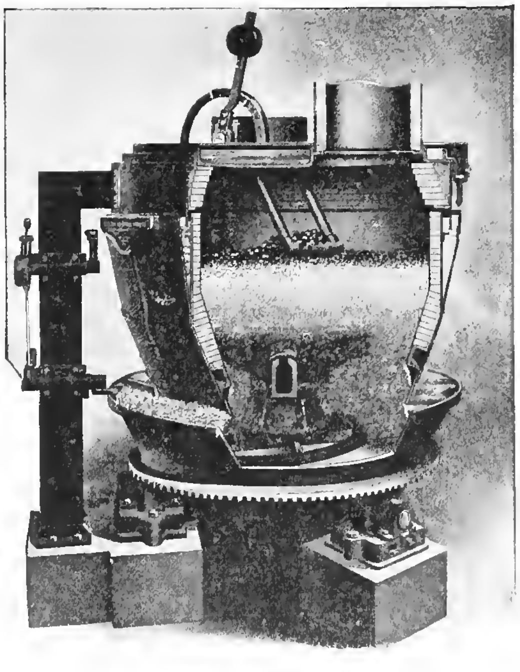
Date		Average Pounds Coal per Hour	Average B. T. U. per Cu. Ft. of Gas	
			U. S. Steel Standard	Total at 32° Fahr.
Feb. 9, 1914	Day	2800	158.5	178.5
	Night	2740	149.0	168.0
Feb. 10, 1914	Day	2740	162.5	183.0
	Night	2690	154.0	173.5
Feb. 11, 1914	Day	2740	168.0	189.0
	Night	2690	151.5	170.5
Feb. 12, 1914	Day	2800	166.0	187.0
	Night	2860	148.0	166.5
Feb. 13, 1914	Day	2800	165.5	186.0
	Night	2800	160.0	180.0
Average		2760	158.5	178.0

Another customer, operating open-hearth furnaces, analyzed an eight-hour continuous sample of the gas practically every day. The average for five months was 3.5 per cent CO_2, 28.8 CO, and 182 B. T. U.

Further experimenting gave them the following gasifying capacities and disclosed the fact that the quality of gas does not suffer at these high working rates.

GASIFYING CAPACITY OF PRODUCER GAS MACHINE

Date	Net Tons Coal Per Day	Operating Hours Per Day	Pounds Coal Per Hour	B. T. U. of Gas	
				U. S. Steel Standard	Total at 32° F.
September 21–22	32.35	23.70	2730	167.0	188.0
September 22–23	36.00	23.05	3120	168.5	190.0
September 23–24	34.15	22.05	3100	165.0	186.0
September 24–25	37.35	22.90	3260	165.5	186.5



SECTION MORGAN GAS PRODUCER

FIRE-BRICK LINING:

The fire-brick lining has been reduced in thickness, and is surrounded by a water jacket which keeps the inner surface cool enough to prevent adhesion of clinker.

MULTI-METAL SEPARATING SCREEN CO., Inc.

68–72 East 131st St.
NEW YORK CITY

PRODUCTS: Wire Cloth; Screens for all Industries; Standard Laboratory Testing Sieves; Silk Bolting Cloth; Respirators; Dust-Hoods; Acid Masks.

WIRE CLOTH:

Wire cloth of absolute precision and utmost strength for every industrial purpose, such as bolting, sifting, filtering and straining, in all meshes from No. 4 mesh to No. 350 mesh, in all metals such as aluminium, brass, bronze, copper, German silver, iron, Monel metal nickel, silver, steel and tinned wires.

METALLIC FILTER CLOTH:

Metallic filter cloth and filter screens, acid and alkali proof, for filtering chemical solutions, sugar juices, fruit juices, etc.

STANDARD TESTING SIEVES:

Sieves from 10-mesh to 350-mesh for chemical and metallurgical laboratory purposes, cement testing, testing the fineness of paint pigments, etc.

SILK BOLTING CLOTH:

In all meshes. Made-up screens furnished to fit any machine.

ACID MASKS:

To protect men handling or pouring acids.

DUST HOODS:

For use in work rooms where dust is especially dense or of a poisonous nature.

RESPIRATORS:

Worn over nose and mouth as a dust protector when working with toxic materials.

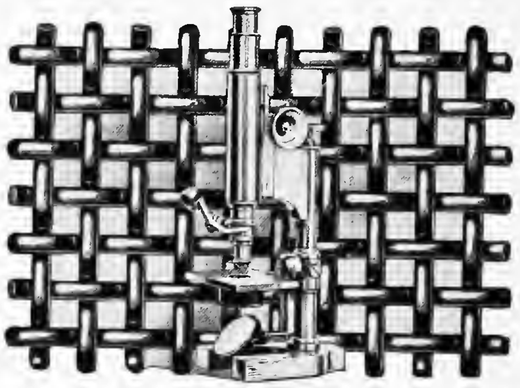
DELIVERIES:

All of the above products are carried in stock for immediate delivery.

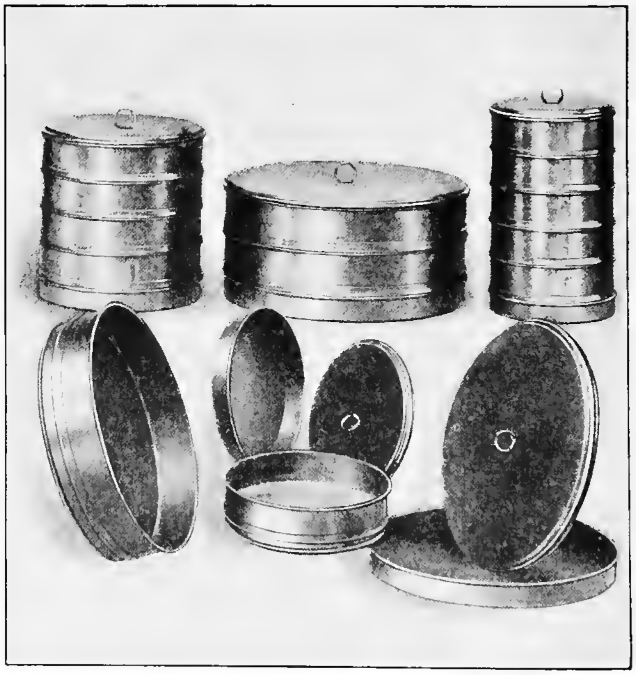
SPECIAL SERVICE DEPARTMENT:

When you are confronted by problems involving sizing, bolting, screening or filtering, we suggest that you avail yourself of our service as screen specialists.

We maintain a special department for making up screens of all sizes and shapes either by sewing, stapling, riveting, welding and soldering.



OUR 200 MESH AS SEEN UNDER A POWERFUL MICROSCOPE



MULTI-METAL STANDARD LABORATORY TESTING SIEVES

NATIONAL GUM & MICA COMPANY

Owning and Operating

NATIONAL GLUE & GELATINE WORKS
NATIONAL COLOR & CHEMICAL WORKS

59th St. and 11th Ave. **NEW YORK CITY**

Sole Sales Agents For

TAYLOR CHEMICAL CO., Penn Yan, N. Y. **OBEX LABORATORIES, Marietta, O.**

PRODUCTS: Glues, Gelatines, Pastes, Fish Glues, Starches, Dextrines, Cements, Liquid Glues, Cold Glues, Flexible Glues, Isinglass, Gums (natural and artificial), Adhesives, Sizings, Softeners, Finishes, Logwood Extract, Hematine, Nigrosine, Indigo, Mica, Ground Mica, Carbon Bisulphide, Phenol (Carbolic Acid), Cresylic Acid, Orthocresol, Aniline Colors, Pulp Colors, Color Lakes, Dyestuffs, Chemicals, Colloidal Clay and all kinds of Colloidal Substances for Technical Uses.

SPECIAL ADHESIVES FOR SPECIAL PURPOSES:

It frequently happens that no ordinary adhesive will work satisfactorily. In such a case our laboratories and experience are invaluable in working out an appropriate and inexpensive adhesive.

COLD GLUES AND ADHESIVES:

We have cold glues and adhesives to work on automatic machinery of every kind, and to replace hot glues for hand and machine work.

GLUE AND GELATINE OF ALL KINDS FURNISHED ON SPECIFICATION:

The various grades of Glues and Gelatines vary by several hundred per cent, and it is important to select and maintain a grade best suited to the work in hand. We can aid manufacturers in fixing their specifications and can furnish material in accordance therewith. (See Allen's Commercial Organic Analysis, Fourth Edition, Vol. 8.)

SPECIAL FINISHES OR SURFACES PRODUCED ON PAPER, TEXTILES, ETC.:

We are prepared to furnish special Sizings and methods to produce metallic, glazed, or practically any desired finish, feel, handle or effect on paper, cloth, thread and the like.

GLUES, PASTES, CEMENTS AND ADHESIVES FOR ALL PURPOSES:

Wood Work
Leather Belts
Bookbinding
Sizing.
Paper Boxes
Carton Sealing
Labeling on Glass and Metal

SUBSTANCES PRODUCED IN EXTREMELY FINE OR COLLOIDAL CONDITION:

We have applied for a broad patent, covering production of colloidal substances by a special method, which may be applied whenever the substances can be produced by precipitation. The fineness of the precipitate can be controlled within reasonable limits. Correspondence is solicited with manufacturers interested in producing and separating fine or colloidal precipitates.

We offer for the consideration of chemical engineers and industrial chemists the service of an establishment where the principles of colloidal chemistry are thoroughly understood and where experience makes possible the application of these underlying principles to the solution of a great variety of industrial problems.

We are prepared to devise for the industrial chemical public, processes for the manufacture of colloidal substances of all kinds for technical uses.

NEWARK WIRE CLOTH COMPANY

WIRE CLOTH IN ALL METALS

222-228 Verona Ave.
NEWARK, N. J.

PRODUCTS:

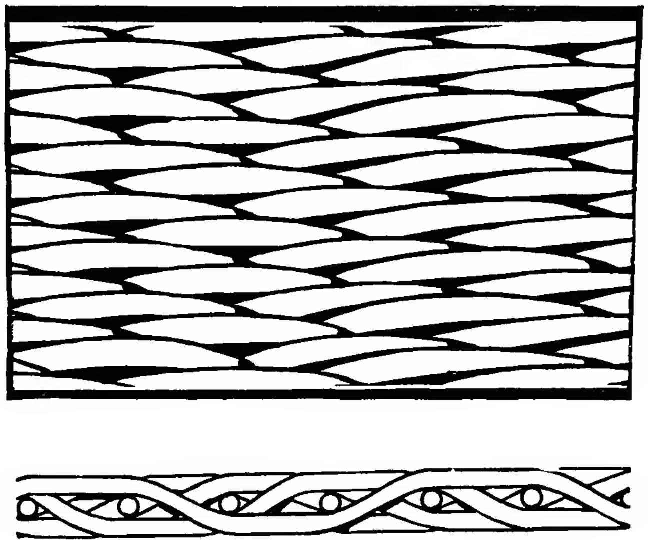
- **Wire Cloth of all grades**
- **Special Weaves**
- **Bolting Cloth**
- **Foundry Riddles**
- **Chemists' Sieves**
- **Flour Sieves**
- **Cement Sieves**
- **Coal and Sand Screens**

BRASS, COPPER AND MONEL METAL WIRE CLOTH:

In the Chemical Industries many materials have to be sized under conditions where rust or corrosion are likely to affect the screens and interfere with the work. For such purposes we manufacture wire cloth of the above metals in all grades.

SPECIAL WIRE CLOTHS TO ORDER:

We are in a position to advise our customers as to what sort of wire cloth is especially adapted for the particular problem they may have on hand, whether it be one of screening, sifting, or filtering. We are specialists in fine meshes and will furnish estimates on orders involving unusual sizes, dimensions of openings, etc.



MAGNIFIED DRAWINGS OF WEAVE AND CROSS-SECTION OF "NEWARK" FILTER CLOTH

The illustrations show the peculiar weave which renders this company's product so desirable for filtering, the construction of laboratory sieves, and many other purposes requiring a fine and even mesh combined with strength, durability and flexibility.

PRICE LIST OF LABORATORY SIEVES

Prices subject to change without notice

WOODEN FRAMES, BRASS WIRE CLOTH

Diameter of Sieve		20 Mesh	30 Mesh	40 Mesh	50 Mesh	60 Mesh	70 Mesh	80 Mesh	90 Mesh	100 Mesh	110 Mesh	120 Mesh	130 Mesh	140 Mesh	150 Mesh	160 Mesh	180 Mesh	190 Mesh	200 Mesh
5 inches.....	Price, per dozen	$2.00	$2.50	$2.50	$2.75	$3.00	$4.00	$4.50	$5.00	$6.00	$6.50	$8.25	$9.00	$10.00	$11.00	$12.00	$14.00	$16.00	$18.00
6 "		2.30	2.75	3.00	3.25	3.50	4.50	5.25	5.75	7.00	8.00	10.00	12.00	13.00	14.00	15.00	17.00	19.00	20.00
7 "		2.50	3.00	3.25	3.60	4.00	5.25	6.00	6.50	8.00	9.00	11.50	14.00	15.00	16.00	17.00	19.00	20.00	22.00
8 "		3.25	3.50	3.75	3.80	4.50	6.00	7.00	8.00	9.50	11.00	13.00	15.00	16.00	18.00	19.00	21.00	22.00	24.00
9 "		3.50	3.75	4.00	4.50	5.00	6.50	8.00	9.00	11.50	13.00	16.00	18.00	19.50	21.00	22.00	24.00	25.00	28.00
10 "		4.00	4.00	4.50	4.75	5.50	7.00	8.50	9.50	12.50	14.00	17.00	20.00	21.00	22.00	24.00	28.00	29.00	32.00
11 "		4.00	4.50	5.00	5.50	6.25	8.00	10.00	11.00	13.00	15.50	18.50	22.00	23.50	25.00	26.00	29.00	31.00	34.00
12 "		4.50	4.75	5.50	5.75	7.00	0.00	10.50	12.00	14.50	17.00	22.00	26.00	28.00	30.00	32.00	35.00	38.00	42.00
14 "		6.50	7.50	8.50	8.75	10.50	13.25	16.00	17.25	21.00	24.00	28.00	32.00	34.00	36.00	40.00	45.00	47.00	50.00
16 "		8.25	10.50	12.25	12.75	14.50	18.00	21.00	24.00	27.00	31.00	34.00	38.00	40.00	44.00	46.00	52.00	55.00	62.00
18 "		10.00	12.00	14.00	16.00	18.50	22.50	26.25	30.00	33.00	36.00	42.00	46.00	50.00	54.00	60.00	64.00	68.00	76.00
20 "		11.50	14.00	16.00	18.00	20.50	26.00	31.00	36.00	40.00	43.00	40.00	52.00	55.00	60.00	68.00	74.00	78.00	96.00

TIN FRAMES, BRASS WIRE CLOTH

Diameter of Sieve		20 Mesh	30 Mesh	40 Mesh	50 Mesh	60 Mesh	70 Mesh	80 Mesh	90 Mesh	100 Mesh	120 Mesh	130 Mesh	140 Mesh	150 Mesh	160 Mesh	180 Mesh	190 Mesh	200 Mesh
6 inches......	Price, per dozen	$8.00	$8.00	$8.50	$9.00	$9.00	$9.50	$12.00	$14.00	$15.00	$17.00	$19.00	$22.00	$26.00	$28.00	$30.00	$32.00	$34.00
7 "		9.00	9.00	9.50	10.00	10.50	12.00	14.00	17.50	18.50	21.00	22.00	24.00	28.00	30.00	32.00	34.00	36.00
8 "		10.00	10.00	10.50	11.00	11.50	13.00	16.00	20.00	22.00	24.00	25.00	28.00	30.00	32.00	34.00	36.00	38.00
9 "		11.00	12.00	13.00	14.00	14.50	16.00	18.00	22.00	24.00	26.00	28.00	30.00	32.00	34.00	36.00	38.00	40.00
10 "		13.00	14.00	15.00	16.00	16.50	18.00	20.00	24.00	26.00	28.00	30.00	32.00	36.00	38.00	40.00	42.00	44.00
11 "		14.00	15.00	16.00	17.00	17.50	19.00	22.00	26.00	28.00	30.00	32.00	34.00	38.00	40.00	42.00	44.00	46.00
12 "		15.00	16.00	17.00	18.00	19.00	21.00	23.00	27.00	30.00	32.00	34.00	36.00	40.00	42.00	44.00	46.00	48.00
14 "		16.00	17.00	18.00	19.00	21.00	23.00	25.00	28.00	32.00	34.00	36.00	38.00	42.00	44.00	46.00	48.00	50.00

NIAGARA ALKALI COMPANY

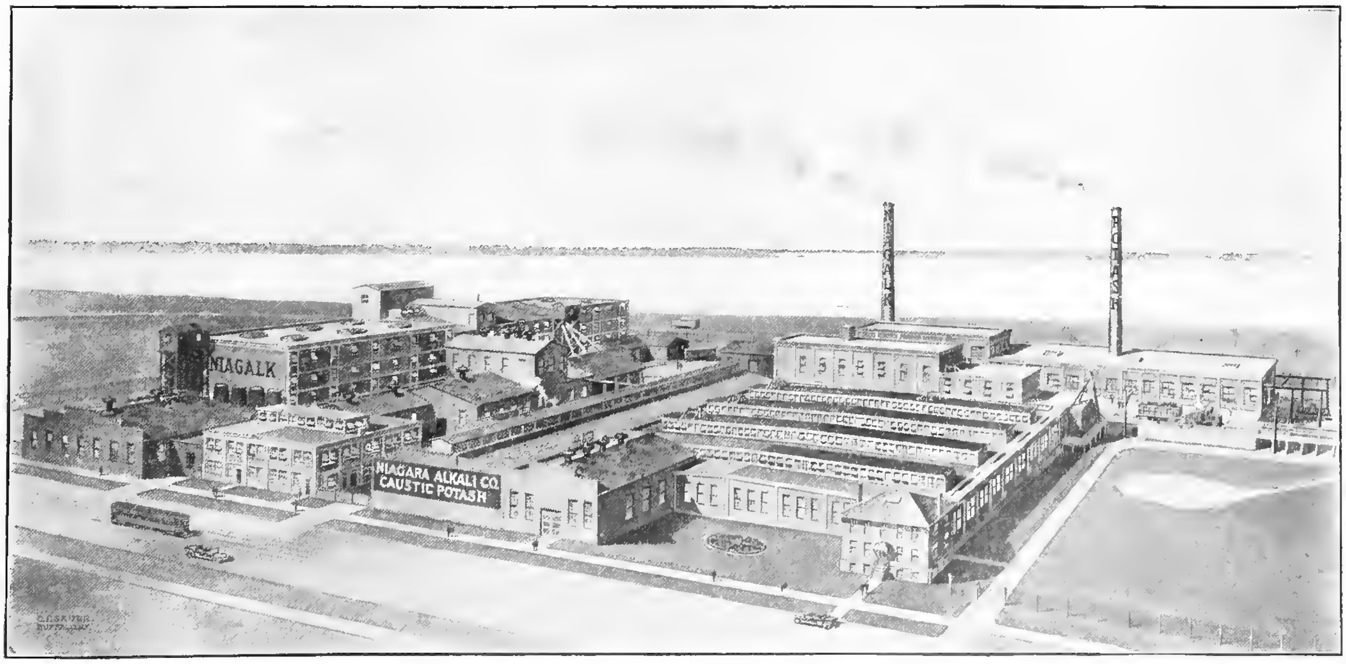
NIAGARA FALLS, N. Y.

N. Y. Office: 18 East 41st St., New York

PRODUCTS: **Caustic Potash, Caustic Soda, Bleach, Chlorine By-Products.**

Our products are at all times of uniform strength.

Our facilities for manufacturing are unsurpassed. Our trademark "Niagalk" is a guarantee of purity.

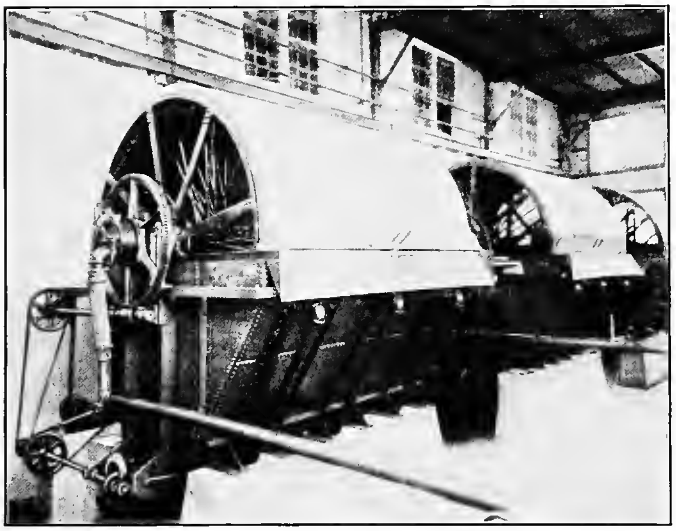


OLIVER CONTINUOUS FILTER CO.

505 Market Street SAN FRANCISCO, CAL.

Cable Address: "OLICONFILT"

PRODUCTS: Continuous and Automatic Washing Filters for Cyanide Plants, Sugar, Bicarbonate of Soda, Potash, Lime, Cement Dust, Acid Precipitates; Dewatering Filters for Ore Concentrates, Ore Slimes, Mineral Paint, Lampblack, Paper Pulp, etc., Automatic Slime Thickeners, Sand Filters, Vacuum Pumps, Air Compressors.



THREE OF THE FORY-FOUR OLIVER FILTERS IN USE BY THE ANACONDA COPPER MINING CO.

GENERAL DESCRIPTION:

The Oliver Continuous Filter consists of a drum or cylinder with open ends, revolving on a horizontal axis, and with the lower portion submerged in a tank containing the pulp to be filtered. The surface of the drum is divided into compartments. A filter medium is stretched over the compartments, being supported underneath by a screen and held in place and protected from wear by a wire winding, the use of which is covered by our patents.

Each section of the drum is connected by two pipes passing through a hollow trunnion to an automatic valve, which controls the application of vacuum for forming and washing the cake and the admission of air for its discharge, another patented feature. Provision is made for applying such washes to the cake as may be needed for complete replacement of solution.

A scraper is fitted across the tank and rests on the wire winding in such manner that the washed cake is entirely removed after being released by air.

An agitator suitable for the pulp to be handled is placed in the bottom of the tank to keep in suspension the heavier particles of slime and to insure a uniform cake.

USES:

The Oliver Continuous Filter was first devised for the filtration of slime in cyanide plants. There are now more Olivers in use in the mills of Mexico, United States and Canada than all other types of filters combined.

One of the widest applications of the Oliver Filter is to the dewatering of concentrates from the oil flotation process in the treatment of lead, zinc, copper and other ores. 90% of filters in use for this purpose are Olivers.

A recent use of the Oliver is for the filtration of saccharate of lime in sugar refineries. The cake is washed more thoroughly than with a pressure filter and with one-third the quantity of wash water. The separation of crystals from mother liquor is another use of the Oliver. This has been very satisfactorily done on sodium bicarbonate, borax, sodium chloride, etc., both from hot and cold solutions.

Gas Companies on the Pacific Coast have adopted the Oliver for dewatering lampblack, a by-product in the manufacture of illuminating gas from crude oil. The lampblack is recovered from the hot wash water, briquetted and sold as household fuel. Over 500 tons of lampblack per day are now being handled by Olivers in these plants.

ACID FILTERS:

For handling acid or corrosive solutions, we build filters in all sizes, the particular materials used in their construction depending upon the kind of solution to be filtered.

SIZES AND CAPACITIES:

Filters are built in many sizes and types, ranging in diameter from 3 ft. to 15 ft. and in length from 2 ft. to 24 ft. Capacities from 1 to 500 tons per day.

The capacity of an Oliver Filter is very much higher per unit of filter area than any other type of filter, averaging on ore slimes 20 pounds per hour per sq. ft. of filter area.

OPERATING COSTS:

Total operating cost per ton of dry solids handled ranges from 3 to 5 cents. Maintenance and cloth renewals, ½ cent.

SPECIAL FILTERS:

We specialize on filters to meet exacting and unusual conditions, and solicit your correspondence.

PACIFIC COAST BORAX COMPANY

100 William Street
NEW YORK
CHICAGO, ILL. OAKLAND, CAL.
Cable Address: BORACIC

PRODUCTS:

Manufacturers of
REFINED BORAX:

Crystalline
Granulated
Powdered

This product is guaranteed 99½% to 100% pure, and is suitable for such technical purposes as enamelling, glass, tanning, etc.

BORAX U. S. P.:

Crystalline
Granulated
Powdered

This grade of Borax suitable for all pharmaceutical and medical purposes.

FUSED BORAX:

This product is also known as Borax Glass and Anhydrous Borax. It is used in crystalline, granulated and powdered form as a flux in refining refractory ores, in mineralogical determinations, etc.

CALCINED BORAX:

This product is used in electrical work as a flux.

BORATE OF MANGANESE:

For use as a dryer in paints.

BORIC ACID (BORACIC ACID):

Refined Crystals
Granulated
Powdered

This product is 99½% to 100% pure H_3BO_3. It is used for making glass and for pharmaceutical and medical purposes and also is allowed to be used as a preservative for codfish.

BORIC ACID U. S. P.:

Refined Crystals
Granulated
Powdered

For pharmaceutical use where a product free from borax, chlorides, sulphates, heavy metals, etc., is required.

BORIC ACID, ANHYDROUS:

Used as a flux in electrical work. Is sold both granulated and powdered.

AMMONIUM BORATE:

Powdered.

PRICES SUBMITTED ON APPLICATION

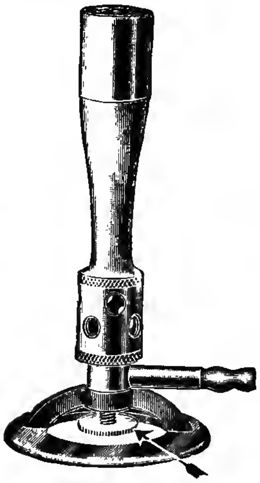
PALO COMPANY

Trade Mark
PALO

Laboratory Supplies and Scientific Apparatus

90-94 Maiden Lane, NEW YORK
PARIS: 21 Rue de l'Echiquier
BERLIN: Alexandrinen Strasse 93-94

PRODUCTS: Apparatus, Laboratory; Special Testing Outfits; Laboratory Glassware; Precision Instruments; Complete Metallurgical Outfits; Chemicals; Radium, Reagents and Mesothorium.



"PALO" BURNER

"PALO" BURNER:

The burner non plus ultra, and an improvement over all burners on the market. Constructed on the Meker principle. The highest temperature can be obtained in a few seconds. This is the latest development of a grid top burner.

DAYLIGHT LAMP

DAYLIGHT LAMPS:

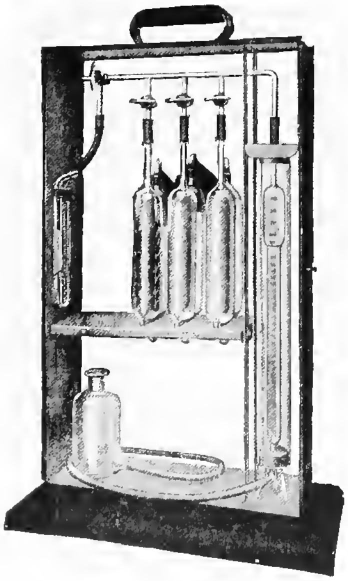
Our daylight lamps produce an artificial daylight which satisfies all color requirements.

Indispensable for detecting colored reactions in chemical laboratories, for testing colors in dyehouses and for inspection rooms in textile mills.

They are made for the most accurate color matching and color comparison work.

PRECISION 100 cc. STANDARD ORSAT APPARATUS:

with scale over the entire length of burette running down to as fine as one-tenth division.



PRECISION 100 cc. STANDARD ORSAT APPARATUS

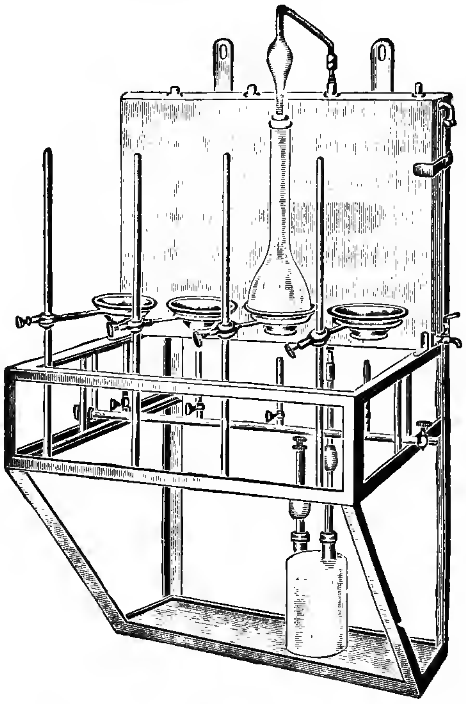
Three absorption pipettes for CO_2, O and CO, respectively.

Both sides of the Orsat are removable, thus making the whole apparatus accessible and easily operated. There are added to it over most of the standard makes a few small refinements that tend to make all parts accessible, easily changed and cleaned. Portable, very light in weight and shipped with all connections, rubber tubing and chemicals. For very accurate work it is unsurpassed. For universities or colleges it can be assembled with or without glass cocks.

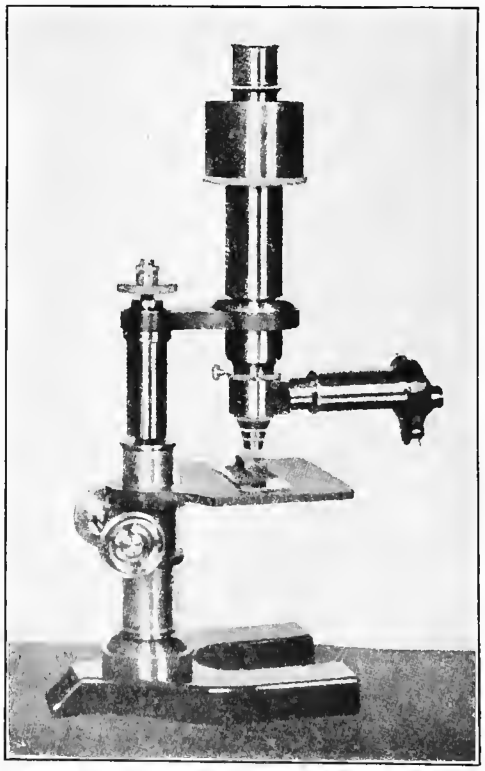
CATALOGUES:

We will be pleased to send, upon request, our General Catalogue and Special Catalogues.

PALO APPARATUS FOR THE DETERMINATION OF NITROGEN



This apparatus consists of a strong condenser mounted in a cast iron frame made to hang on the wall. The condenser is provided with inlet and outlet tube for water. Adjustable burner arrangement with stopcocks. In the front of the frame are supports with ring clamps for flask holders. The lower pan of the frame has a wooden shelf to carry Woulff bottles, receivers, etc. The burners, flasks, receivers, etc., are handled from the front and without interference.



METALLOGRAPHIC MICROSCOPE:

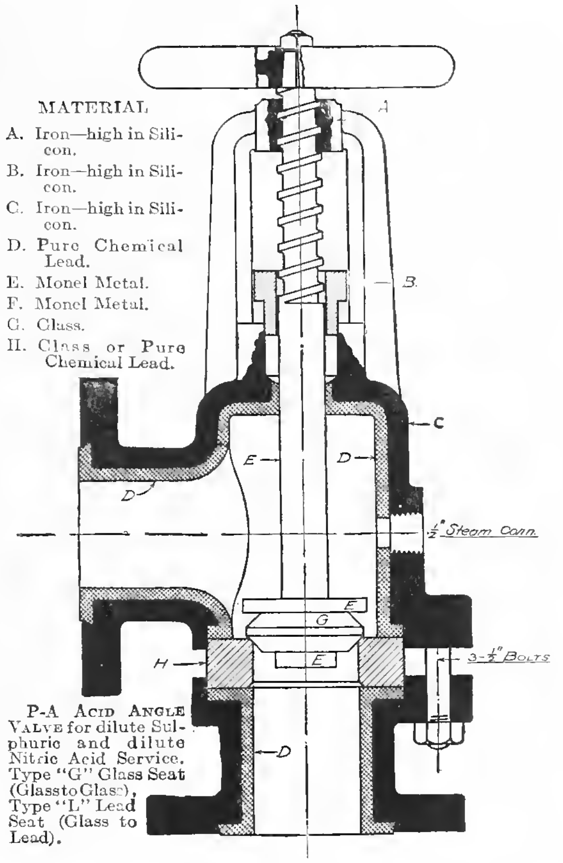
On this instrument the stage or specimen holder (without movable slide) is moved vertically by the focusing rack and pinion and the adjustment can be perfected by the micrometer screw. This micrometer screw acts on the support of the object, but to such a small extent, that it is not necessary to modify the height of the light.

PATTERSON ALLEN ENGINEERING CO.

Manufacturers of Valves for Special Service

2 Rector Street, NEW YORK

PRODUCT: Valves for Special Service.



MATERIAL

A. Iron—high in Silicon.
B. Iron—high in Silicon.
C. Iron—high in Silicon.
D. Pure Chemical Lead.
E. Monel Metal.
F. Monel Metal.
G. Glass.
H. Glass or Pure Chemical Lead.

P-A Acid Angle Valve for dilute Sulphuric and dilute Nitric Acid Service. Type "G" Glass Seat (Glass to Glass), Type "L" Lead Seat (Glass to Lead).

Fig. 1

CROSS SECTION P-A ACID ANGLE VALVE

P-A ACID ANGLE VALVE FOR HANDLING DILUTE SULPHURIC ACID AND DILUTE NITRIC ACID:

This valve is shown in Figs. 1 and 2. No iron at any point coming in contact with the fluid. Note that the operating stem is made of Monel Metal.

EVERLASTING VALVE ACID TYPE FOR HANDLING CONCENTRATED SULPHURIC AND NITRIC ACID:

This valve is shown in Figs. 3, 4, and 5. It is ideal for this work, the iron running high in Silicon. The construction is simple and inspection of the cuts explains its entire operation. The valve is composed of a top and bottom bonnet, a disc and a lever and post.

It is made in all sizes from ¼" to 24". It is now standard in hundreds of plants.

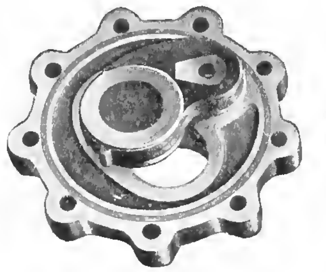


Fig. 3

EXPLODED VIEW SHOWING SEAT AND DISC

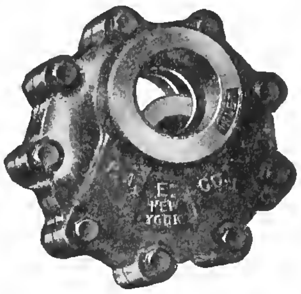


Fig. 4

SCREWED TYPE

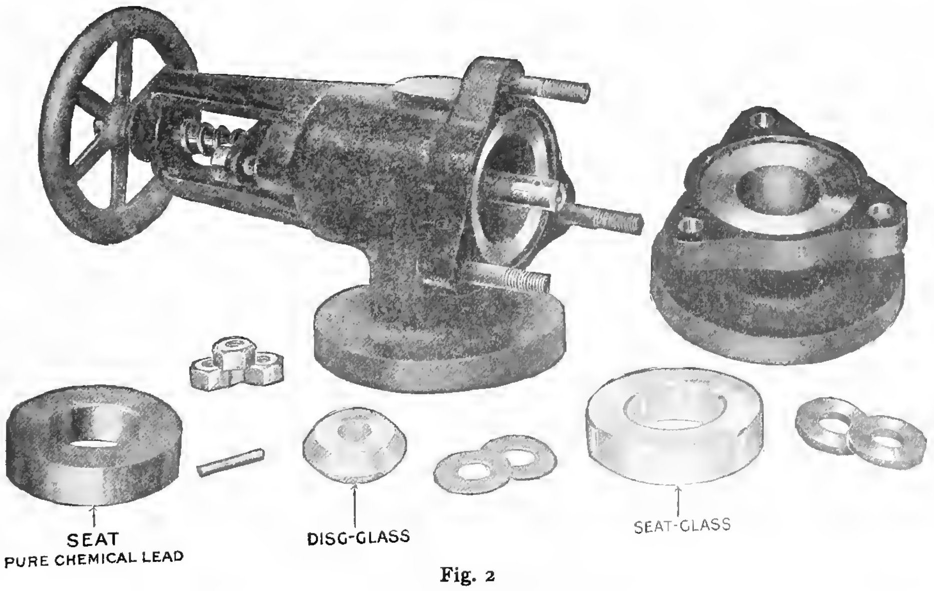


Fig. 2

P-A ACID ANGLE VALVE

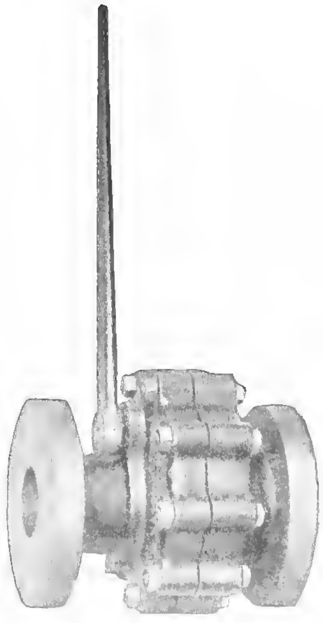


Fig. 5

EVERLASTING VALVE FLANGED TYPE

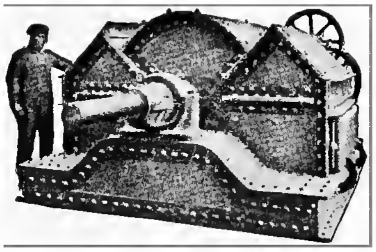
PENNSYLVANIA CRUSHER CO.

NEW YORK
50 Church St.

Stephen Girard Building
PHILADELPHIA

PITTSBURGH
Peoples Bank Building

PRODUCTS: "Pennsylvania" Hammer Crushers, "Pennsylvania" Single Roll Crushers, and Bradford Coal Cleaners.



PATENTED
HAMMER CRUSHERS

"PENNSYLVANIA" SWING-HAMMER PULVERIZERS:

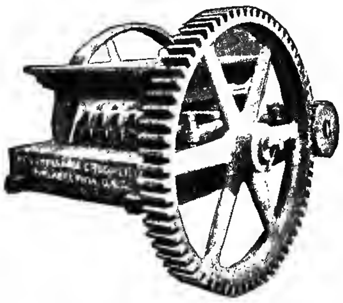
For reducing Chemicals to about 1/16″ and finer. For general Coal, Limestones, Oyster Shells, Tankage, and a wide variety of materials used in the industries.

(1) Quick Adjusting Cage
(2) All-Steel Frame
(3) Removable Steel Wear Liners
(4) Large Diameter Steel Support Discs
(5) Ball and Socket Self-Aligning Bearings

Main frame of fabricated Steel practically immune from breakage. Removable Steel Wear-Liners, "Ball and Socket" Bearings, 6, 8 and 10 rows of Hammers, large diameter Steel Discs, quick adjustable Grinding Cage. Built in capacities ½ ton to 400 tons houry. By weight the "Pennsylvania" is more than 90% steel.

STEEL FRAME DESIGN

No. of Mach.	Hopper Opening (in.)	Pulley (in.)	Speed R.P.M.	Floor Space	Capacities
S- 1......	15 x 10	12 x 8	1200	4′ 6″ x 5′ 3″	Depend on Material. Write Us Your Requirements.
S- 2......	15 x 13½	14 x 8	1050	6′ 3″ x 5′ 3″	
S- 3......	18 x 13½	16 x 10	1050	6′ 3″ x 5′ 8″	
S- 4......	24 x 13	20 x 12	1050	6′ 3″ x 6′ 4″	
S- 5......	24 x 16	20 x 16	800	8′ 0″ x 8′ 0″	
S- 6......	30 x 16	24 x 16	800	8′ 0″ x 8′ 6″	
S- 7......	36 x 16	24 x 20	800	8′ 0″ x 9′ 3″	
S- 8......	42 x 16	24 x 24	800	8′ 0″ x 10′ 0″	
S- 9......	48 x 16	24 x 28	800	8′ 0″ x 10′ 9″	
S-10......	54 x 19	30 x 26	750	8′ 10″ x 12′ 0″	
S-11......	60 x 19	30 x 30	750	8′ 10″ x 12′ 9″	
S-12......		Motor driven			
S-13-3....	48 x 19	" "	720-750	10′ x 13′ 9″	
S-14......	54 x 19	" "	750	10′ x 14′ 3″	
S-15......	60 x 19	" "	750	10′ x 14′ 9″	

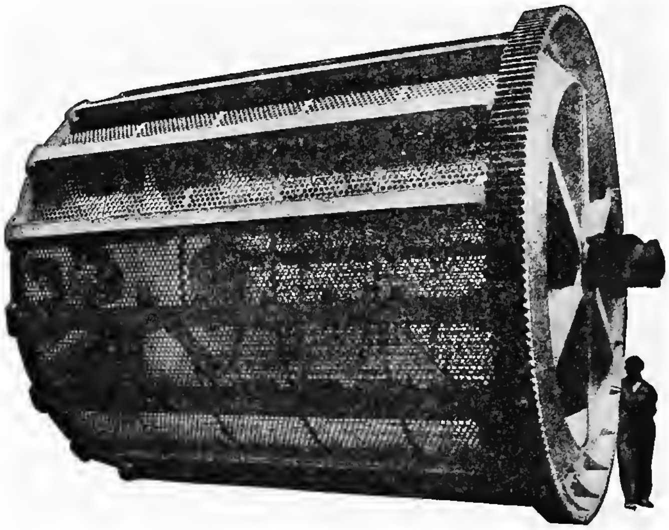


"PENNSYLVANIA" SINGLE ROLL CRUSHERS

For coarse and moderately fine crushing of Chemicals, Coal, Coke, Lime, Limestone, Fire Clays, Shales, Phosphate Rock, etc. Excellent for Stoker-feed.

FEATURES:

1. Big reduction of large lumps in *one* operation. 2. Fed from bin, car, grab-bucket or steam shovel—no mechanical feeder. 3. Can't be choked by overfeed—different from 2-roll Crusher. 4. Roll won't spread no matter how heavily fed. 5. Can be started with hopper full. 6. Automatic safety device. 7. Readily adjustable for varying sizes of crushing. 8. Wear parts quickly accessible. 9. Slow speed—35 to 40 R. P. M. 10. Easy on Horse Power. 11. Several sizes, ruggedly built, simple design. 12. Very economical of headroom. 13. Low upkeep and installation. 14. No changing pitch diameters.



PATENTED

"PENNSYLVANIA" BRADFORD COAL CLEANERS

For Coke Plants, Coal Washeries, Power Houses, etc.

In addition to its distinct advantages as a Crusher, this machine has the remarkable ability to *automatically* remove impurities such as Slate, Bone, Sulphur Balls or Binder from Bituminous Steam and Coking Coals, thereby reducing the objectionable Ash and Sulphur.

It is used extensively in preparing R.O.M. coals in By-Product and Bee-Hive Coking plants, Coal Washeries, &c.

In connection with its crushing and cleaning functions for R.O.M. coal for *large Power Houses*, the "Pennsylvania" Bradford is most efficient in removing stray iron, coupling pins, mine props and all sorts of impedimenta that damage Conveyors, Stokers and other Power House machinery.

For Coal Washeries and Stoker-feed it crushes R.O.M. *with less fines than Roll or any other type.*

Absolutely automatic in operation, low horse-power, runs 12 to 15 R.P.M., requires no labor to operate other than occasional oiling. Is practically "foolproof."

THE PFAUDLER CO.,

ROCHESTER, N. Y.

CHICAGO, ILL.,
1001 Schiller Bldg.

NEW YORK CITY,
110 West 40th St.

SAN FRANCISCO, CAL.,
512 Sharon Bldg.

PRODUCTS: Glass Enameled Steel Apparatus, either Jacketed or Single Shell, for the Preparation and Storage of Corrosive or Sensitive Liquids; Mixing Tanks; Kettles; Vacuum Pans; Autoclaves; Storage and Car Tanks; Specially Designed Plant Equipment.

CONSTRUCTION:

Tanks are built of open hearth steel, either welded into one piece or of sectional construction; this makes a shell of unusual strength and durability.

ENAMELS:

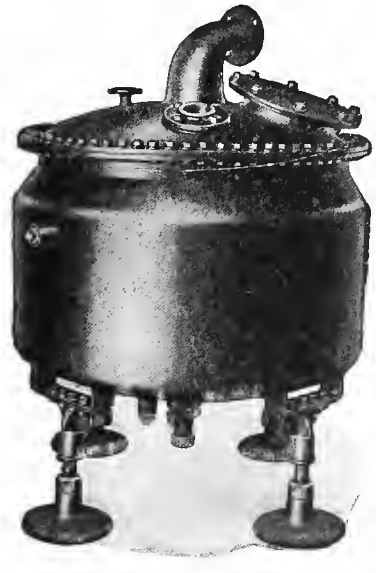
The enamel specified—we have developed several grades, for different uses—is then fused **into** the steel at very high temperature, producing a glazed, protective coating which is resistive to the corrosive action for which it is specified, and which has an unusual degree of integrity. It is not harmed by sudden changes in temperature, and can usually be cleaned without scouring.

AGITATORS, SPECIAL APPARATUS AND FITTINGS:

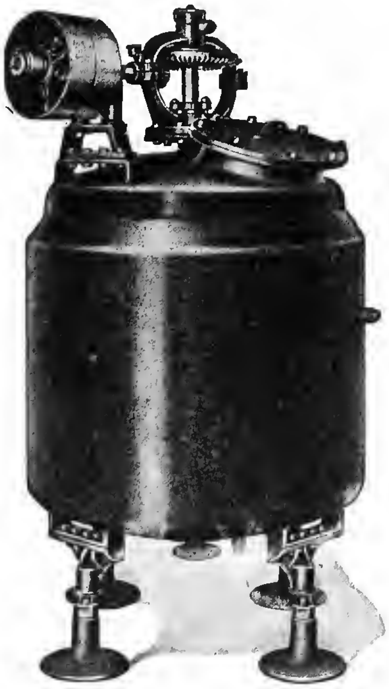
Pfaudler Mixing Apparatus is **suspended** in the tank, usually upon ball bearings; all gears are of cut steel, and usually are tightly enclosed. Agitators are either of steel, glass enameled, or of brass or other metal, tinned or silver plated.

We build agitators in many styles of both the one-way and two-way types, correctly designed to make a quick and thorough "mix," and have furnished successful apparatus for handling a great variety of materials.

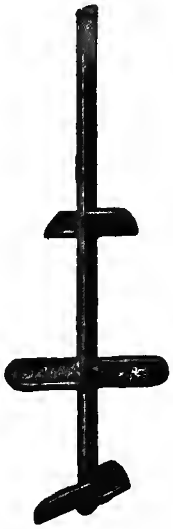
Fittings, of suitable design and material, may be placed as desired. Nipples for these may be welded on and enameled at all points exposed to the liquid.



Jacketed Still with Bolted-on Cover; Enameled Inside, and Clear to Edge of Flange on the Neck. As a kettle, cover may be omitted.



One-piece Jacketed Mixing Tank, Suitable for High Pressure in Jacket or Inner Tank.



Glass Enameled Steel Agitator, Propeller Type, such as installed in the tank at the left.

CAPACITIES:

One-piece containers can be furnished in capacities from 5 gallons to 4,000 gallons. In sectional construction, capacities are practically unlimited; by sealing the joints of the latter with gaskets of suitable material, many corrosive liquids can be safely handled and stored in them.

SERVICE:

We maintain a very efficient Research Department for confidential consultation with manufacturers upon the development of special apparatus, and have received many appreciative acknowledgments of the value of this service. Our suggestions carry no obligation whatever.

GUARANTEE:

We guarantee the materials and workmanship of all of our work. Our responsibility, as the largest manufacturers of glass enameled steel tanks in the world, is unquestioned.

POWERS—WEIGHTMAN—ROSENGARTEN CO.

NEW YORK PHILADELPHIA ST. LOUIS

PRODUCTS:
Acetone
Acid, Acetic, Arsenic, Arsenous, Boric, Carbolic, Chromic, Citric, Formic, Gallic, Hydrochloric (Muriatic), Hydrofluoric, Lactic, Molybdic, Nitric, Oleic, Oxalic, Phosphoric, Pyrogallic, Pyroligneous, Salicylic, Stearic, Sulphurous, Sulphuric (Oil Vitriol), Tannic, Tartaric
Alum, Ammonia, Potassium, Dried, C. P., Chrome, Ferric
Aluminum Salts
Ammonia Water, 16°, 20°, 26°
Ammonium Chloride, Sulphate and other Salts
Ammonium Sulphide Solution
Amyl Acetate
Antimony, Metal and Salts of
Antimony Chloride Solution (Butter of Antimony)
Arsenic, Metal, salts of, arsenates and arsenites

Barium Salts
Bismuth, Metal and Salts of
Blue Vitriol
Borax, U. S. P., C. P., Fused, Calcined
Bromine, U. S. P.

Cadmium, Metal and Salts of
Calamine Prepared
Calcium Salts
Calomel, U. S. P.
Carbon Tetrachloride
Chalk Precipitated
Chloroform
Chromium Salts and Chromates
Cobalt, Metal and Salts of
Collodion
Copper Salts
Corrosive Sublimate
Cream of Tartar
Cresol, and Compound Solution of
Cyanide, Sodium, Chloride Mixture, Chloride-Carbonate Mixture, Potassium

Dextrine

Ether Acetic
Ether, U. S. P. Concentrated, Washed
Ethyl, Butyrate, Formate, Valerate
Epsom Salt

Fluorspar
Formaldehyde Solution, U. S. P.
Fusel Oil

Glauber's Salt
Glycerin
Gold Salts
Gold and Sodium Chloride

Hexamethylenamine
Hydrogen Dioxide Solution, U. S. P.
Iodine, Crude, Resublimed
Iodine, Tribromide
Iodoform
Iron, Metal, U. S. P., Chloride lumps, Chloride Solution, Chloride Tincture, Nitrate Solution, Protochloride Solution, Subsulphate Solution (Monsel's), Tersulphate Solution

Lead, Metal and Salts of
Lithium Salts
Litmus Cubes
Litmus Paper

Magnesium Salts
Manganese Salts
Mercury, Distilled, Redistilled, U. S. P.
Mercury Salts
Methylene Blue
Monsel's Solution
Morphine Sulphate

Nickel, Metal and Salts of

Phosphorous, Red, Yellow
Plaster of Paris
Potash Caustic
Potassium Salts

Quinine Sulphate

Red Precipitate
Rochelle Salt

Sal Ammoniac
Sal Soda
Sal Tartar
Silver Metal Precipitate
Silver, Nitrate and other salts
Soda, Caustic and Solution of
Soda Chlorinated Solution
Sodium, Metal and salts of
Solutions, Test, Volumetric
Starch Iodized
Strontium Salts
Sugar Lead
Sulphur, Flour, Flowers, Fused, Precipitated, Sublimed, Washed
Sulphur Chloride

Talcum, U. S. P., Purified
Tannin
Tartar Emetic
Tin, Metal, Protochloride and other salts, Protochloride Solution

Uranium Salts

Verdigris (Basic Copper Acetate)

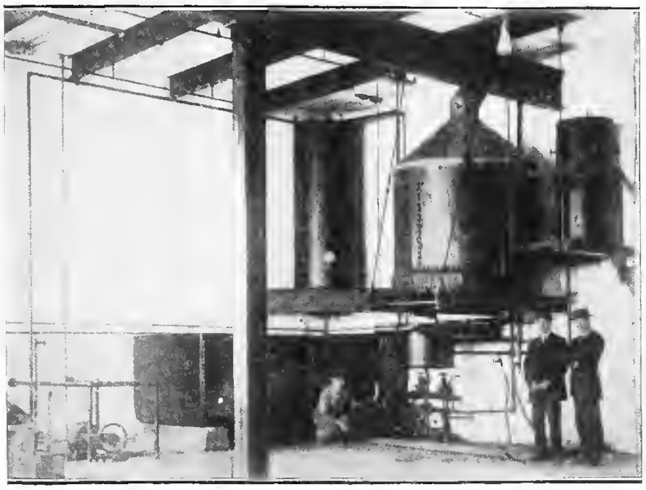
Water Distilled

Zinc, Metal, Chloride, Chloride Solution, Oxide, Sulphate and other salts

PROCESS ENGINEERS, Ltd.

McGill Building
MONTREAL, P. Q.

PRODUCTS: Erfurt Patented Sizing Appliance.



ERFURT SIZING PROCESS:

By means of a process invented several years ago by a German paper maker, named "Max Erfurt," a rosin size, containing more than 50% of the rosin in a free state, can be diluted, to a thin solution, the free rosin being in such an atomized condition, that separation does not take place on standing and gives good sizing results.

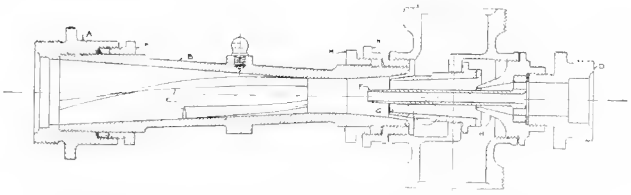
Erfurt discovered that high free rosin emulsions could be prepared only by the use of hot water under high pressure and at a certain temperature. He obtained the best results by using a specially constructed injecting emulsifier which takes in hot water and blows it by means of steam against a fine stream of hot size. The steam is only used as a means of applying pressure to the hot water for it does not come into direct contact with the size. The size mixture flowing from this apparatus passes directly into cold water, and in this way the solutions are stabilized, so that they do not alter on standing.

The free rosin in these solutions is nearly all in the colloidal state, and is able to penetrate the paper fibres, before the size is precipitated by the alum. It is on this account that more sizing effect is obtained from a given amount of rosin and that less alum is required to produce sizing results.

As an illustration let us take one size cooked with 16% of soda ash and another cooked with 8% soda ash. Dilute solutions of these will have the same appearance, but different physical properties. The first solution will be soapy, the second sticky. The first does not have any effect on the paper stock until the alum is added, but while the second solution is being mixed with the stock, the dissolved free rosin is leaving the solution and being taken up by the fibres. It is found in practice, that wherever the first size requires three parts of alum the second will require about two parts, while the alum excess in the beaters remains practically the same.

Opinions vary regarding the effectiveness of free rosin sizes, because this kind of size gives variable results depending upon how it is used. When the proper kind of free rosin solutions are made, however, they are quite safely used in making the finest grades of paper. In the fine paper mills of Europe, the Erfurt System is generally used for making such solutions. Paper sized with less rosin will not discolor quickly, other conditions being equal.

Certain conditions are injurious to sizing results, such as chemical residues in the stock, consisting of free acid, free lime, or bleach liquors and hard waters, and these conditions often require special treatments. Variable drying conditions may also effect the sizing. Average experience has shown that these detrimental influences affect one kind of size about as much as another unless special remedies are provided. The average working conditions in the paper mill are not unfavorable, however, to sizing results and hence the average efficiency will depend upon the quality of the size solutions.



IMPROVED ERFURT EMULSIFIER (PATENTED)

There are twenty-nine installations of the Erfurt Patented Sizing Process in the United States and Canada. These supply size to sixty-nine machines, Fourdrinier, Harper, Cylinder and Flying Dutchman—making 1,590 tons of paper per day, and the size emulsions are used in the following grades—News, Wrapping, Kraft, Bag, Fibre, Book, Coated Mill Blanks, Covers, Bristol, Board, Loft Dried Bond, Ledger, Linens, Coated Tag, Writing, Litho, Oyster Pail.

QUOTATIONS FROM A FOREIGN EXPERT:

"There is no limit to the proportion of free rosin that can be taken up by the size, but until the introduction of Erfurt's Process, the workable limit of Free Rosin was about one-third of the combined rosin."

"With Erfurt's atomizer the minutest subdivision is obtained regardless of the conditions and the strong size may be blown direct into cold water."

PROVOST ENGINEERING CORPORATION

220 Broadway NEW YORK
Works: Provost and Eagle Streets, Brooklyn, N. Y.

PRODUCTS: Filter Presses, Vacuum Pumps, Pressure Blowers, Oil and Gas Furnaces, Pulverizing and Grinding Machinery; Recovery of Waste Products.

PROVO FILTER PRESSES:

For the efficient separation of solids from liquids extensively used in the Sugar, Chemical, Color, Oil, Clay Industries, etc.

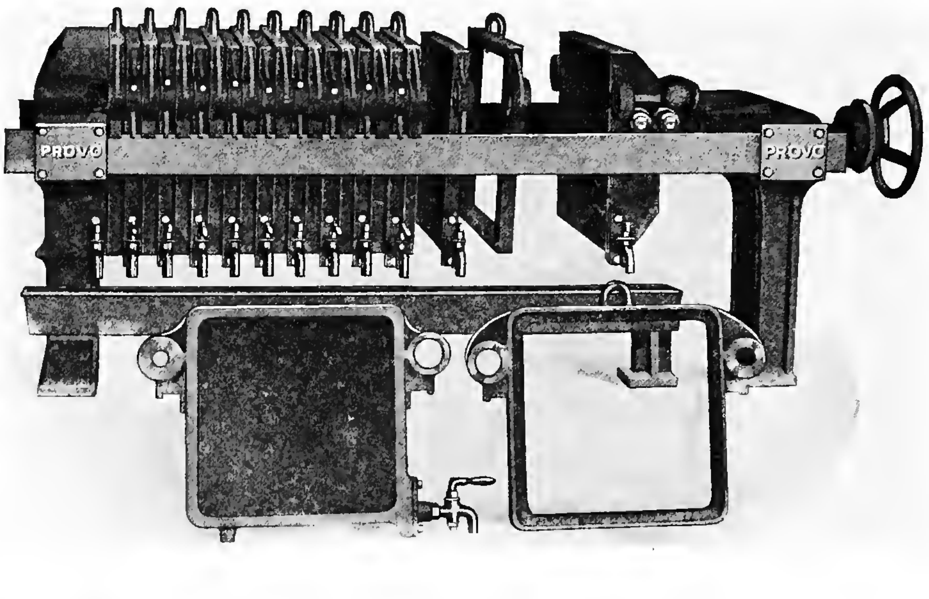
Special presses to suit unusual conditions. As specialists in the art of pressure filtration, we are pleased to tender any technical data which our years of experience in solving many difficult problems in separation has put us in possession of.

INQUIRIES:

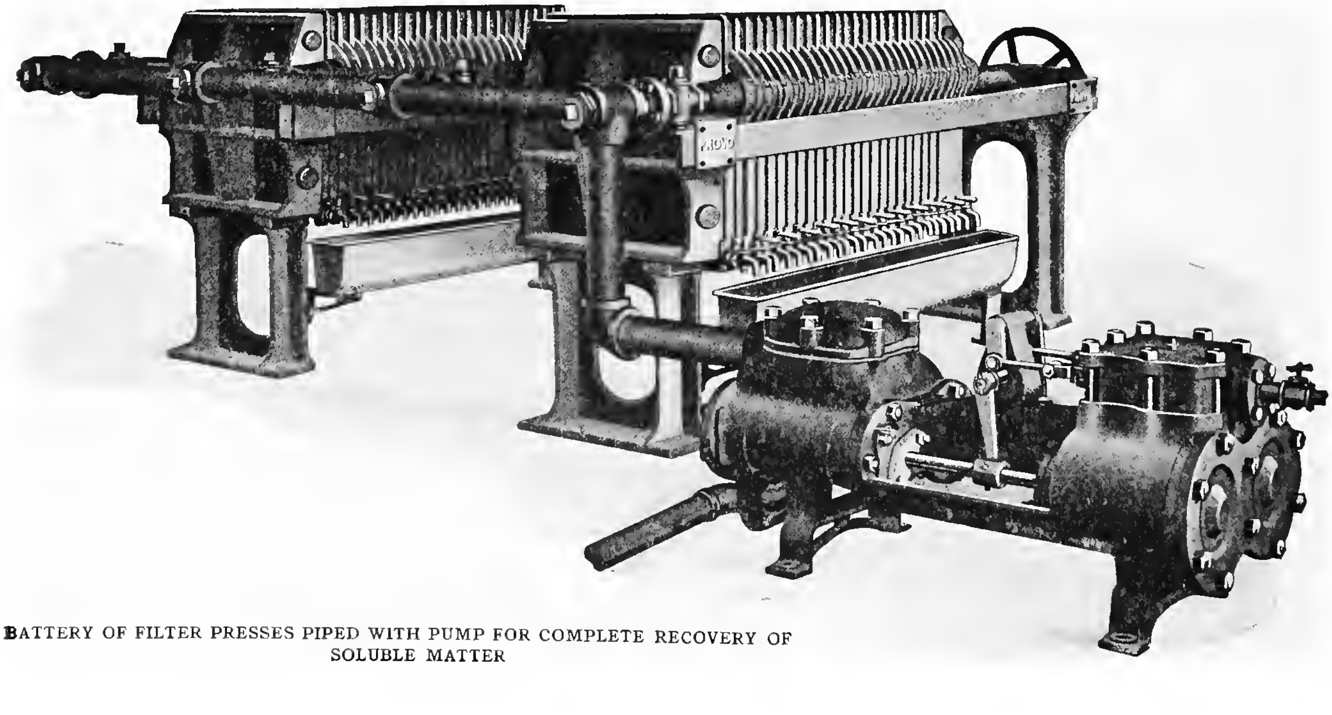
We are pleased to submit at any time full data covering the use of our Filter Presses for any special purpose and if necessary in order to ascertain the proper type or size for any new product, we render (upon receipt of a suitable quantity of material) a full and complete report based on results gained in our laboratory.

SUPERIOR FEATURES OF THE PROVO FILTER PRESS:

Owing to method used in carrying away filtrate we obtain an increased rate of flow. Liberal joint surfaces and construction of filtering medium support avoids all undue stress on cloth thereby increasing its life, a most important item. Inlet and outlet ports of ample size in all types prevent breakage of plates and frames and allows free passage of material to and from filtering chambers. Our wooden presses are so constructed that they will not warp, thus avoiding the objectionable feature of leaking. Our bronze plates are of such construction that they permit replacement at minimum expense.



SIDE FEED FILTER PRESS WITH LIXIVIATION ATTACHMENT. NO HOLES IN CLOTH NECESSARY



BATTERY OF FILTER PRESSES PIPED WITH PUMP FOR COMPLETE RECOVERY OF SOLUBLE MATTER

RAYMOND BROTHERS IMPACT PULVERIZER COMPANY

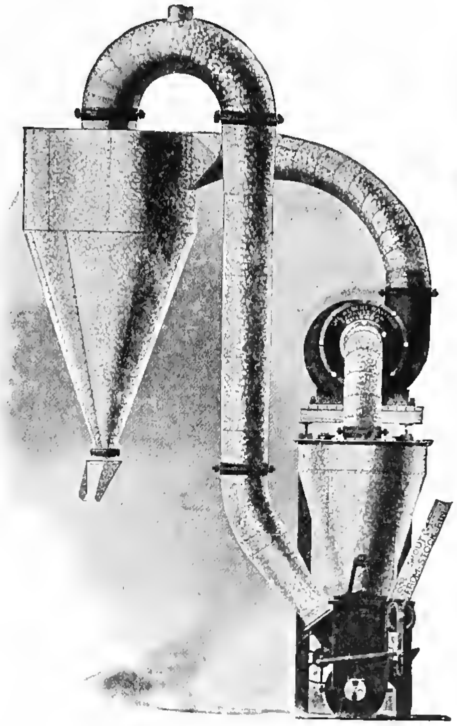
1309 North Branch St. **CHICAGO, U. S. A.**

PRODUCTS: Roller Mills, Automatic Pulverizers, Vacuum Air Separators, Special Exhaust Fans, Dust Collectors.

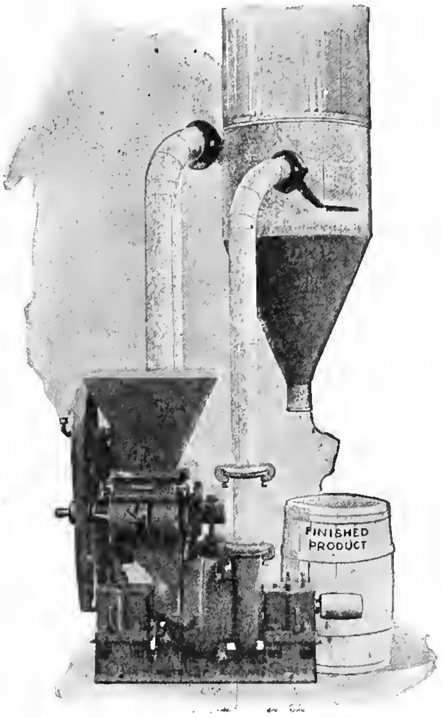
We design special machinery and methods for Pulverizing, Grinding, Separating and Conveying all powdered products.

The requirements of each plant are studied separately, and an installation designed to economically and thoroughly accomplish the desired results.

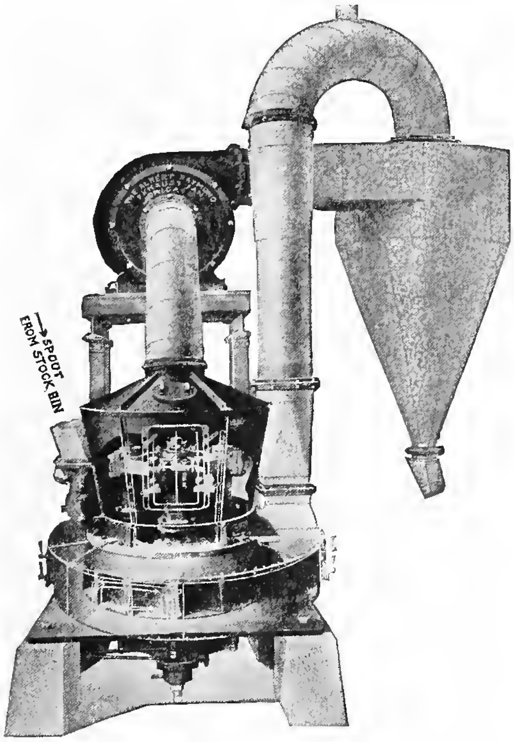
Our # 12 catalog gives complete information in regard to the Raymond System.



RAYMOND AUTOMATIC PULVERIZER



# 0000 AUTOMATIC PULVERIZER



RAYMOND ROLLER MILL

RAYMOND ROLLER MILL:

Built for capacities of one to ten tons per hour and for either fine or coarse grinding. Has been adopted as standard equipment by many large industrial corporations for grinding materials such as coal, coke, gypsum, limestone, phosphate rock, etc., to 100 mesh and talc, graphite, barytes, etc., to 200 mesh and finer.

RAYMOND AUTOMATIC PULVERIZER:

Built in several sizes for grinding to any fineness. Can also be equipped with our Special Automatic Throwout Attachment for separating impurities from Hydrated Lime, Litharge, etc. Has been adopted by the United States Government for separating the values from Radium Ore. It will, like the Roller Mills, grind to any fineness by a simple adjustment in the Air Separator.

# 0000 AUTOMATIC PULVERIZER:

This mill is especially useful in handling small quantities of such material as dry colors, paints, clays and similar products. It is very compact, occupies 4 by 4½ feet of floor space, requires 5 H.P. and gives from 200 to 1000 pounds per hour, capacity depending, upon material.

Fineness from 100 to 200 mesh.

THE ROESSLER & HASSLACHER CHEMICAL CO.

100 William St. NEW YORK CITY

SALES OFFICES:

Boston, 40 Central St.
Chicago, 192 N. Clark St.
Cincinnati, 28 West 3rd St.
East Liverpool, O.
Kansas City, Mo., Kemper Bldg.
New Orleans, 613 Canal Bank Bldg.
Philadelphia, 941-943 Drexel Bldg.
St. Louis, 1022 Wright Bldg.
San Francisco, 625 Market St.
Cleveland, O., 308 Euclid Ave.

CHEMICAL WORKS:

Perth Amboy, N. J.

ELECTROLYTICAL WORKS:

Niagara Electro Chemical Co., Niagara Falls, N. Y.

WAREHOUSES:

14 Jay St., Manhattan, N. Y. C.
Foot 39th St., So. Brooklyn, N. Y.

PRODUCTS:

Cyanide of Sodium—
"Cyanegg" (Cyanide of Sodium, in egg shape)
"Cyanogran" (Cyanide of Sodium, granular)

Copper Cyanide	for electro-plating
Zinc Cyanide	
Silver Cyanide	
Copper Trisalyt	
Zinc Trisalyt	
Silver Trisalyt	
Gold Trisalyt	

Ceramic Colors
Acetone and Solvents
Oxide of Tin
Chloroform
Chlorine Derivatives
Peroxide of Sodium
Peroxide of Hydrogen, Commercial
Albone (Concentrated Peroxide of Hydrogen, 25 vol.)
Active Oxygen Products of Highest Efficiency, viz.:
Peroxides and Perborates of Sodium, Calcium, Magnesium, Strontium, and Zinc.
Peroxide Zinc Soap (R. & H. Pat.) for toilet purposes (antiseptic and mild bleaching)
Oxone, for Instantaneous Production of Pure Oxygen
Gold and Silver Brand Quinine, Sulphate and Salts
Acetanilid
Acid Carbolic, crystal and liquid
Acid Cresylic
Acid Oxalic
Acid Salicylic
Alum Chrome
Arsenic, red and white
Barium Chloride
Barium Hydrate
Barium Nitrate
Bleaching Powder (lime chloride)
Carbon Tetrachloride
Epsom Salts (magnesium sulphate)
Iron by Hydrogen
Manganese Oxide
Naphthalene
Phosphoric Acid, syrupy and glacial
Platinum Salts
Potash Bicarbonate
Potash Bichromate
Potash Binoxalate
Potash Carbonate, calcined and hydrated
Potash Chlorate
Potash Oxalate
Potash Permanganate
Sal Ammoniac, white and gray
Soda Bichromate
Soda Chlorate
Sodium Sulphide, crystals and fused
Strontium Nitrate
Dr. Schaefer's Lithia Salts, viz.:
Carbonate, Benzoate, Citrate, Salicylate, etc.
Cocaine, Caffeine, Coumarine
Saccharine, 500 and 550 Strength

AUGUST ROOS' SON

Manufacturers of Copper Chemical Apparatus

429-431-433 East 91st Street NEW YORK, N. Y.

Founded in 1860

PRODUCTS: Chemical Coppersmithing, Including Construction of

- **Autoclaves.**
- **Digestors.**
- **Condensers.**
- **Distilling Machinery.**
- **Drums.**
- **Evaporators.**
- **Extractors.**
- **Kettles with and without stirrers.**
- **Pipe and Fittings.**
- **Stills.**
- **Tanks of all kinds.**
- **Vacuum Dryers.**
- **Vacuum Pans.**
- **Wood Distillation Apparatus.**
- **Complete Plants for:—**
  - **Distilling,**
  - **Extracting,**
  - **Refining, etc.**

We are also prepared to do work partly or entirely tin-lined, also sheet aluminium, brass, monel-metal, etc.

SERVICE:

We will always be pleased to figure on your requirements in our line. Wherever possible submit blueprints or sketches and make explanations as detailed as possible. When desired we will submit suggestions for equipment and in every way possible co-operate with your own engineers or chemists in carrying out their ideas.

FACILITIES:

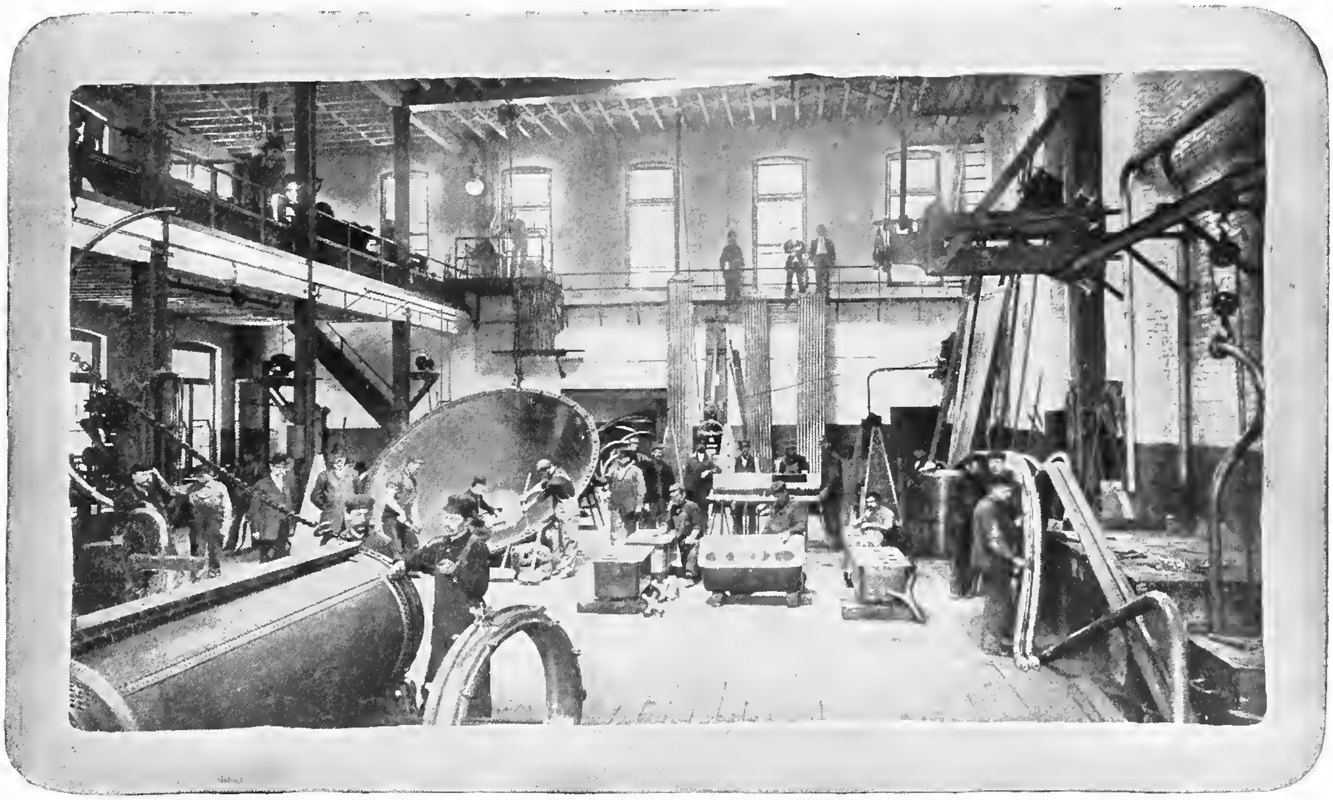
Our shop is situated conveniently in New York City, consequently we are in a position to give prompt and satisfactory deliveries. Our shop is one of the most modern and efficient coppersmithing establishments in the United States and provides ample facilities for carrying out the largest and most difficult pieces of copper chemical construction.

EXPERIENCE:

The cleverest engineering design is of little use if expert workmanship is not at hand to carry it out. Based on fifty years of experience we are able to interpret chemical engineers' designs in such a manner that a satisfactory, durable piece of equipment capable of carrying out the purpose for which the chemist or engineer designed it is the result. The accomplishment of this depends on a knowledge of the minute details of coppersmithing which only long experience, skilful, painstaking workmen and a well-equipped shop can provide. All of these factors are found in our concern.

DESIGN:

We are always ready to consider the design of suitable apparatus for carrying out chemical processes. Our chemical engineers are at your service to design apparatus for distilling, extracting, refining, solvent recovery and other chemical equipment.



Part of Our Modern Well-Equipped Coppersmithing Plant

SCHAUM & UHLINGER, Inc.

Glenwood Avenue and Second Street **PHILADELPHIA**

PRODUCTS: Centrifugal Dryers for Chemical Textile and Laboratory use.

Machines are built in various types, and in 12 sizes ranging from 12″ to 66″ in regular patterns.

POSSIBILITIES OF CENTRIFUGAL EXTRACTION:

Extraction from the goods of the liquid used in dyeing, bleaching, rinsing and carbonizing of all fabrics, and from fibres, such as silk, wool, cotton, ramie, jute, hemp, pulp, etc., either finished or in the raw state.

For removing the liquid from hides, pelts, etc.

For precipitating solids suspended in liquids, such as chemicals from their mother liquids, grit from ink, paint, oils, etc.

For the reclaiming of paint, stain, oil, etc., from rags, waste wipers, and for many similar materials, where waste would otherwise occur.

Separating such products as molasses from sugar crystals with the aid of steam, heat, etc., clarifying and washing sugar and similar materials.

Aerating, filtering and purifying liquids and separating them from solids such as yeast, chalk, colors, etc.

The drying of products to prepare them for shipment and also of all kinds of refuse preparatory to disposal are among the uses to which "whizzers" are profitably applied.

In general the application of centrifugal force can be taken advantage of in practically every case in which it is desired to rid a solid of the liquid saturating it.

SPECIAL FEATURES:

The simplicity of design and rigid worry-proof construction reduce upkeep to a minimum. The construction of our baskets is such that they stand up under the speed for which they are designed with a maximum factor of safety. The bearings are of improved dependable design, lubricated in such a way as to require the least possible attention.

The drive in every instance is a system which has endured years of hard work; needs minimum care, and is easily controlled, whether belt, steam, electric or water-power is used.

The scientific design and self-balancing arrangement of our various types are of the highest standard which only competent engineers and years of experience can produce.

LABORATORY CENTRIFUGALS:

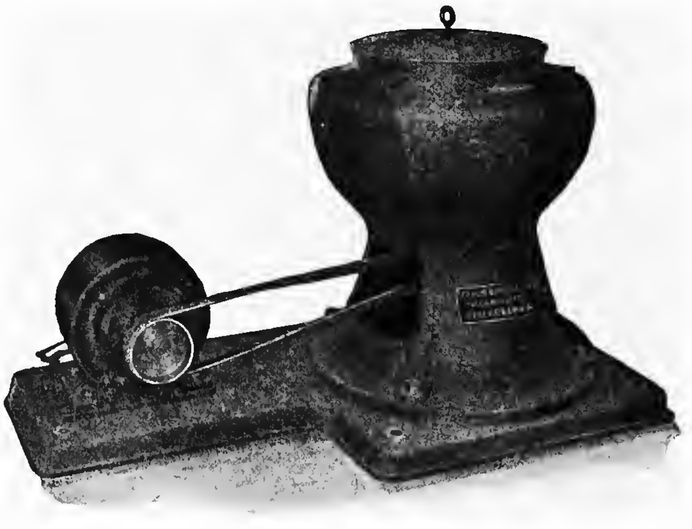
Our laboratory centrifugal combines the advantages of threee separate machines in one.

It can be used as a self-balanced machine with a perforated bowl or it can be readily changed to a rigid bearing machine, with a separator bowl for separating liquids of different densities, or can be fitted with a bottle holder for precipitating samples in bottles. Although the bowl and bottle-holder are securely fitted to the spindle when in use, they can be very quickly changed. Machine is constructed strongly of the best materials and of liberal proportions. Motors for A. C. or D. C. current and a sub-base taking both machine and motor, making the machine self-contained.

A brake is provided for bringing the machine quickly to a stop, and acts as a "boot-jack" to straighten up an unevenly balanced load.

The machine can be bought rigged for any of the above purposes and other features added from time to time as needed, as all parts are interchangeable. This machine has proved itself to be a valuable asset in the chemical laboratory, combining in one machine an extractor, a separator and a centrifugal.

Tests made with this machine indicate many profitable applications of centrifugals in chemical manufacturing. These tests are made under direct supervision and can be checked at any time and under conditions very nearly approximating to those prevailing in the manufacturing plant.

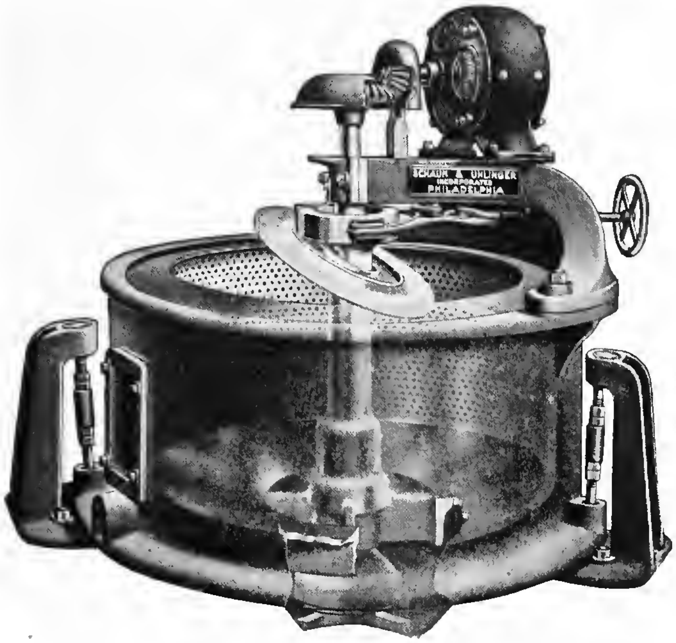


12 in. LABORATORY CENTRIFUGAL

Three Machines in One—Extractor, Separator or Centrifuge by a Quick and Easy Change

Continued on Next Page

CENTRIFUGAL EXTRACTORS:

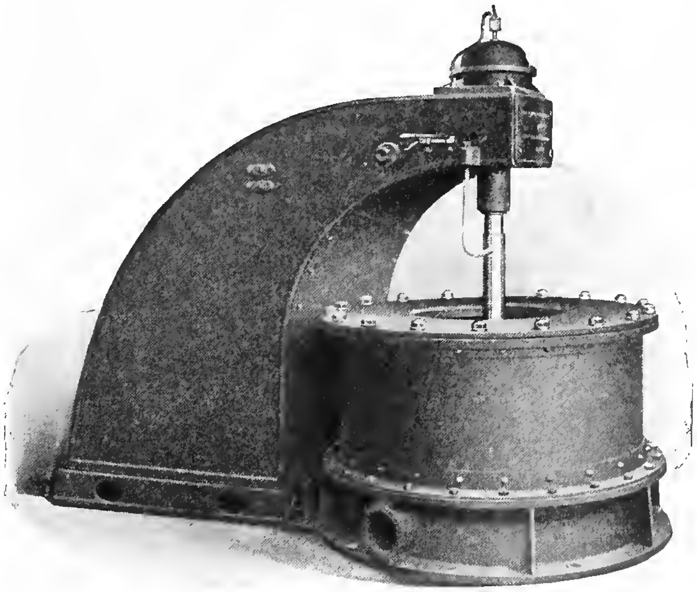


Electric Driven, "Textile Type" with Bottom Discharge

Rigid bearing; self-balanced "Textile Types" for metallurgical and chemical work.

Our "textile" types have given good service in handling chemicals, and when fitted with solid (unperforated) baskets, become very satisfactory separators, especially when it is desired to separate a comparatively small amount of sediment from a large amount of liquid. Machines can be furnished with a tight cover to retain gases and vapors.

Where electric drive is used the motor windings are impregnated to protect them from corrosive vapors. Ample bearings are provided and lubrication is well taken care of. The control is placed conveniently at hand with effective brake.



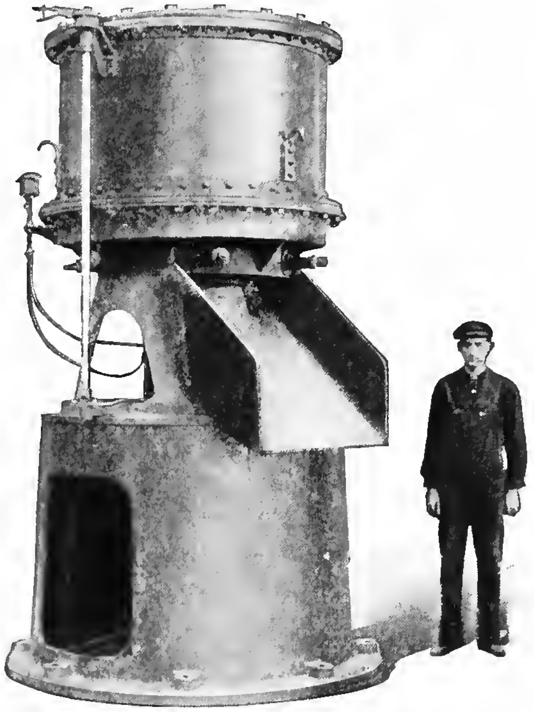
Suspended Type Centrifugal, for Motor, Engine or Belt Drive

SUSPENDED TYPE CENTRIFUGALS:

Our suspended type machines are strongly constructed with the same satisfactory operating characteristics as the under-driven types.

While the under-driven, bottom discharge machines gives the fullest access to the basket, and are, generally speaking, the most satisfactory type machine for this class of service, there are occasional conditions which make an over-driven machine the more desirable.

UNDER-DRIVEN TYPE "S" CENTRIFUGALS:



Underdriven Bottom Discharge Self-balancing Type Centrifugal, with Subbase

Under-driven Type "S" Centrifugals are of very sturdy construction. They have the trough cast integral with the base, have ball thrust bearings and are well lubricated. They operate with either motor, water-wheel, or belt drive, and where electric drive is undesirable on account of explosive or corrosive vapors, a special engine is furnished. Machine is constructed for hard and continuous service and acid-resisting materials are used wherever the material comes in contact with the machine.

This type is used exclusively in some of our largest by-product coke plants for drying ammonium sulphate, and has been a great success.

CENTRIFUGALS FOR SPECIAL PURPOSES:

We are frequently called upon to design machines to meet special conditions; and to make machines of special designs furnished by our customers. Our long experience in the manufacture of centrifugal machinery, together with our shop-equipment and engineering force enables us to give the best of satisfaction.

We solicit inquiries regarding the adaptability of our centrifugal machines to various processes, and will test materials and give our best advice without obligation on the part of those making the inquiry.

SCHAAR & COMPANY

Hexagon Brand Laboratory Apparatus

1025 South State Street CHICAGO, ILL.

Hexagon Brand
Chicago

PRODUCTS: Complete line of Laboratory Apparatus and Supplies consisting of Analytical Apparatus; Balances and Weights; Burners, Gas and Oil; Calorimeters, Fuel and Gas; Cement Testing Apparatus; Centrifugals; Chemical Glassware; Chemicals; Colorimeters; Crushers and Grinders (Industrial and Laboratory); Distilling Machinery and Apparatus; Electrical Measuring Instruments; Evaporating Dishes; Filter Paper; Filters, Water; Furnaces, Electric (Laboratory); Furnaces (Muffle); Gas Apparatus; Glass; Glass Blowing; Heating Apparatus (Laboratory); Hot Plates (Laboratory Purposes); Hydrometers; Laboratory Supplies; Microscopes; Microtomes; Oil-Testing Instruments; Platinum Ware (Laboratory); Porcelain Ware, Laboratory; Pulverizers, Laboratory; Pumps (Laboratory Vacuum); Pyrometers; Quartz Glass; Reagents; Rubber Tubing, Laboratory; Scientific Apparatus; Silica, Fused; Stoneware; Chemical Laboratory; Thermometers; Thermostats; Triangles; Water Baths (Laboratory).

LABORATORY APPARATUS:

We make under the "HEXAGON" Trade Mark, in our own shops, such Laboratory Equipment as Electric Heaters, Resistance Boxes, Electric Ovens, Electric Distilling Apparatus, Bunsen burners of all types, Clamps, Supports, etc.

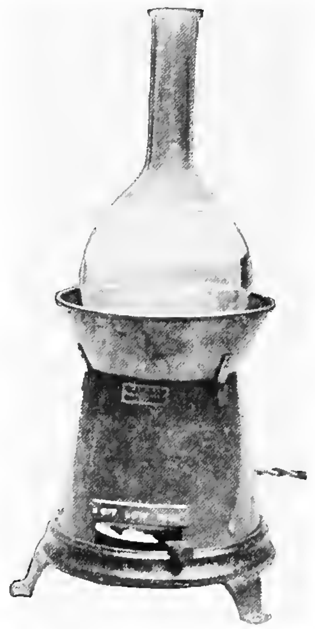
We can make any special apparatus in Glass or Metal needed by the Analytical or Research Chemist.

The best American and Foreign makers of Laboratory Glassware, Porcelain and special apparatus contribute to our large stock.

Our factory facilities are at the disposal of the chemist, whose original ideas we will gladly work out.

DELIVERIES:

Immediate Delivery from stock on Chemicals, Laboratory Glassware, Porcelain and General Apparatus.



Patent Applied For

No. 12736

HEXAGON HEATER

$7.50 Net

Weight 5 Lbs. When ordering specify voltage.

A NEW "HEXAGON" PRODUCT:

We illustrate a new "Hexagon" Product for heating flasks, beakers and test tubes, also for distillations, Kjeldahl digestions, etc.

This heater is designed for practically all purposes for which Bunsen Burners and Hot Plates are used.

As a flask heater, substituting the ordinary tripod or support and burner, it is used as shown in the cut. The top is large enough to accommodate a one liter flask. For use as a hot plate a metal disc is supplied which fits on the top. For heating test tubes a perforated cylinder is supplied, which fits into the center of the heater between the coils. Several tubes may be heated at the same time.

Two heats may be obtained consuming 275 and 550 watts.

Substantially made, mounted on a base which may be screwed to the table.

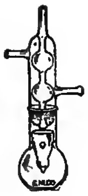
SCIENTIFIC MATERIALS CO.

711–719 Forbes Street **PITTSBURGH, PA.**

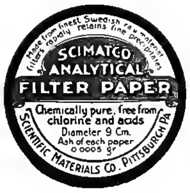
Factories: PITTSBURGH, PA.; ILMENAU, GERMANY

PRODUCTS: Chemical and Metallurgical Laboratory Equipment, Efficiency Instruments and Pyrometers.

Analytical Balances and other instruments of precision for laboratories are made in our own Precision Instrument shop and the very finest workmanship is guaranteed.

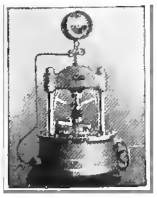


Glass Apparatus for laboratories is one of our specialties and our glass blowing shop is one of the most complete in the world. We also carry a complete line of beakers, flasks, etc.


Made from finest Swedish raw material
filters rapidly retains fine precipitates
SCIMATCO
ANALYTICAL
FILTER PAPER
Chemically pure, free from chlorine and acids
Diameter 9 Cm.
Ash of each paper 0.0005 gr
SCIENTIFIC MATERIALS CO. PITTSBURGH PA

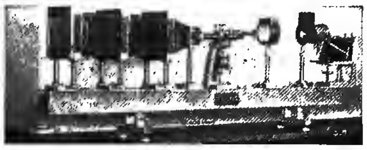
Filter Paper for analytical work of the finest quality yet sold at low prices. This paper holds fine precipitates and filters rapidly; it is also low in ash.

Laboratory Hardware of latest design is made in our own shop. The Scimatco Burner is one of our specialties; this burner replaces the blast burner for many purposes.



The Scimatco-Brinell Hardness Testing Machine gives direct readings of the hardness of metals and is the only machine having an automatic depth measuring device. This machine was designed in our metallurgical laboratory.

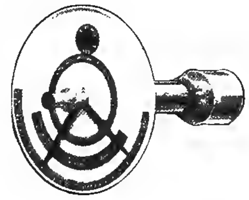
The Scimatco Optical Bench is the finest and most up-to-date outfit for taking micro-photographs of metals.



The Scimatco pressure and draft measuregraphs of the hydrostatic type are the most accurate and reliable instruments for measuring small changes in pressure.

The Scimatco spring type recorders for pressure and vacuum are substantial and reliable instruments for higher pressures. These instruments are part of our complete line of efficiency instruments.

The Scimatco Optical Pyrometer reads directly the temperature of materials in the molten state and is the most accurate means known for measuring very high temperatures.



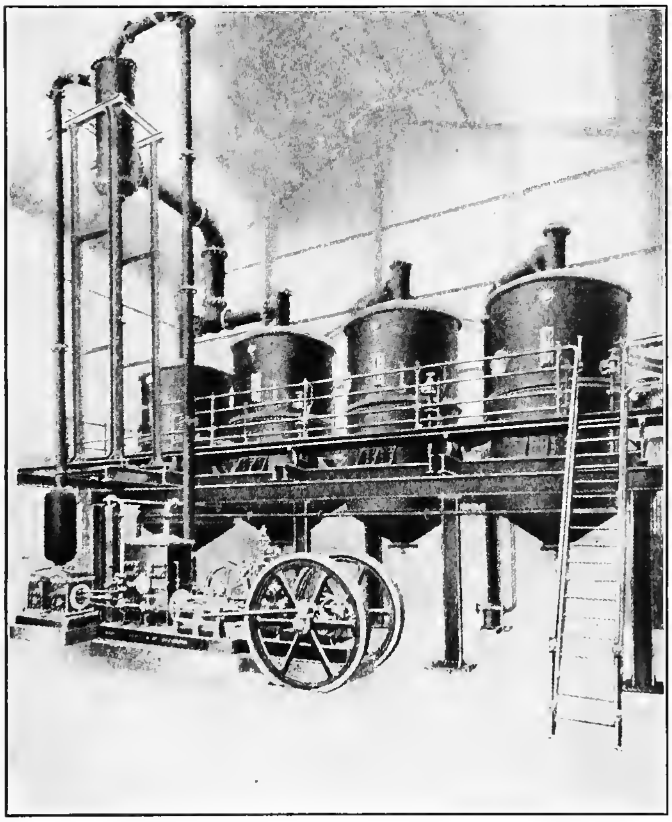
Scimatco Base Metal Pyrometers are designed to fulfil the requirements of industrial plants for checking temperatures wherever heat is employed.

ERNEST SCOTT & CO.,

FALL RIVER, MASS.

KINGSWAY HOUSE, LONDON, W. C. GLASGOW BUENOS AIRES COLOMBO SINGAPORE
Also in CANADA: C/o Process Engineers, McGill Building, MONTREAL, P. Q.

PRODUCTS: Vacuum Evaporators, Distilling Apparatus, Vacuum Dryers, Vacuum Melting and Digesting Apparatus, Vacuum Condensers, Vacuum Pumps, Solvent Extractors, Mixers, Digesters, Dryers, Insulators, Filters, Impregnators, Autoclaves, Stills, Rotary Incinerators, Glycerine Recovery Apparatus, Glycerine Refining Apparatus, Caustic Soda Recovery Apparatus, Paper-Makers' Liquor Recovery Apparatus, Solvent Recovery Apparatus, Oil Extraction and Recovery Apparatus and Apparatus for Recovery of Coke-Oven and Coal-Tar Products, Benzol, Toluene, Sulphate of Ammonia, etc.



CAUSTIC SODA MAKING AND SODA RECOVERY PLANT: These plants are specially adapted for pulp and paper mills and for treating the spent washings of mercerizing plants. They consist of a complete apparatus for concentration, incineration and causticising. Exhaust steam is utilized, recovery is up to 90% and construction is such that heating surface incrustation is reduced to a minimum. Plants are self-discharging and a high-grade ash is produced possessing a fine coral-like appearance.

SULPHITE LIQUOR RECOVERY: These plants are similar to our soda recovery plants but are constructed of a specially treated acid metal guaranteed to withstand sulphite liquor.

SOLVENT RECOVERY: From the processes of varnish and explosives manufactures, rubber-coating machinery, dry cleaners' spent spirit, etc.

OIL EXTRACTION AND RECOVERY: From packing house tankage, bones, seeds, leather scraps, skins, filter-press cakes, engine wipes, linters, cotton waste and residues of all kinds.

GLYCERINE RECOVERY: From soap lyes and twitchell sweet water at a cost as low as $7.50 per ton of glycerine, this allowing for fuel, labor and chemicals. Recovery can be obtained even more economically where exhaust steam is available. Multiple effect apparatus supplied for larger sizes. Further economy can be procured by introducing the system which we recommend of evaporating caustic lye in the same plant in separate effects. Each equipment is a complete plant including tanks, pipes, filter press, steam-driven force pump, patent evaporator with all fittings including salt extractor, vapor pipes, catch vessel and fittings, jet condenser and steam-driven vacuum pump.

GLYCERINE REFINING: These plants will yield dynamite glycerine in one distillation from soap-makers' glycerine and chemically pure glycerine in two distillations; from saponification glycerine chemically pure glycerine can be obtained in one distillation; from distillation glycerine partly chemically pure glycerine and partly dynamite glycerine can be obtained in one distillation at a cost of distillation of about $5.00 per ton, the yield being within 2% of the actual quantity treated.

VACUUM MELTING AND DIGESTING APPARATUS: For hygienically dealing with animal waste, tallow, etc. All noxious fumes completely consumed. Greater economy in operation. Improved products.

VACUUM DRYERS: Stationary, rotary and continuous installations. The various types being specially designed for drying rubber, cocoa, coffee, fruit, vegetables, milk and other food products, fish, blood, glue, gelatine, seeds, grains, pencil and other woods, colors, dyes, extracts, etc.

VACUUM EVAPORATORS: For economically and rapidly concentrating trade and other liquors. Any liquor dealt with. Several thousand installations now at work.

DISTILLING APPARATUS: For dealing with fat, acids, oils, water, solvents, etc.

T. SHRIVER & COMPANY

Hamilton St. and Franklin Ave.
HARRISON, N. J.

Established 1860
Western Union Code

PRODUCTS: Filter Presses, Strainers, Pumps, Filter Cloth, Filter Paper.

CONSTRUCTION AND FEATURES:

These presses are designed so as to get the greatest amount of strength, combined with lightness and facility of handling. Castings are of a superior grade of iron and made in our own foundry. In our machine-shop we have built special tools to machine the different parts, thereby obtaining most accurate work. As all this work is done in our own works we are able to make good our guaranteed deliveries. All parts are machined to templates, so that any part broken by accident can be replaced by a duplicate that will go into place without any filing or fitting.

We have increased the joint surfaces on our plates and frames, thereby greatly prolonging the life of the filter-cloths.

Inlets and outlets are large to avoid clogging. A closing gear of our own device makes it possible for one man to close our largest press without assistance.

The pyramid surface on our plates makes our press more efficient than any other as it holds the cloth away from the surface of the plate, allowing free passage of the filtrate through the cloth.

Our counterbalanced thrust block enables the operator to draw back the follower without burring up the thread of the thrust screw, a constant source of trouble in large presses.

To facilitate the handling of plates in our largest presses, we have rollers under the handles, which permit plates to roll instead of slide on the side bars.

Our larger presses are equipped with Gear and Pinion Closing Device geared 4 to 1, thereby increasing the closing power in that proportion, thus enabling the operator to tighten the press with one quarter the exertion he would have to use if the press were equipped with single ratchet device.

Screwed clip nut cloth fastners keyed to the plate enable one man to clothe our center feed presses where two are generally employed.

FILTER PRESSES FOR SPECIAL PURPOSES:

We are continually required to get up special filter presses for special purposes and our experience in this line is at your disposal.

If you have anything that cannot be filtered in the ordinary way, call on us. At any rate do not give up the idea of filtering your material until we have investigated it for you.

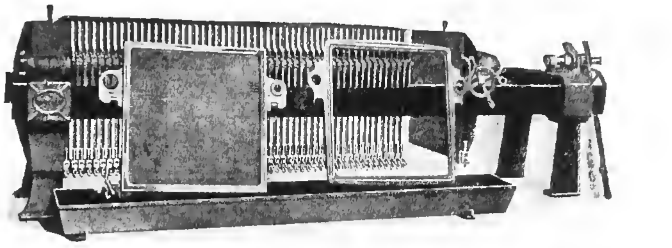
When we are unsuccessful in our endeavor we make no charge for our experiments.

We have built steam jacketed presses which had to be kept at 300° F.

TYPE "E" FILTER PRESS:

Square, Side Feed, Open Delivery, Flush Plate and Frame, Washing Filter Press.

This type has the inlet on one side of the head instead of in the center and the material passes along through holes in the handles of the plates and frames. This cored channel is kept from leaking by using rubber collars inserted in the holes of each plate and frame.



TYPE "E" FILTER PRESS

The washing channel is on the other side of the head. The wash-water passes through the cake and discharges from every alternate cock, the remaining cocks being closed.

The particular advantage of these presses is in the fact that plain cloth or paper can be used. There are no holes on the face of the plates and therefore no holes have to be cut in the cloths.

TYPE "G" PRESS FOR VOLATILE LIQUIDS:

Square, Corner Feed, 3-Eyed, Closed Delivery, Flush-Plate and Frame Filter Press.

This Press is peculiarly adapted to the filtration of liquids that are volatile at ordinary temperatures, as the filtrate is discharged through a pipe at one corner of the head, and, therefore, can be kept from exposure to the atmosphere.

WOODEN CHAMBER FILTER PRESSES:

For some acid liquors, it is absolutely necessary to use a filter press, all parts of which coming in contact with the liquor are of wood or some acid resisting material. As a rule presses made of wood are more or less unsatisfactory, but after a number of experiments we have finally constructed many efficient and durable wooden presses.

EXPERIMENTAL LABORATORY PRESS:

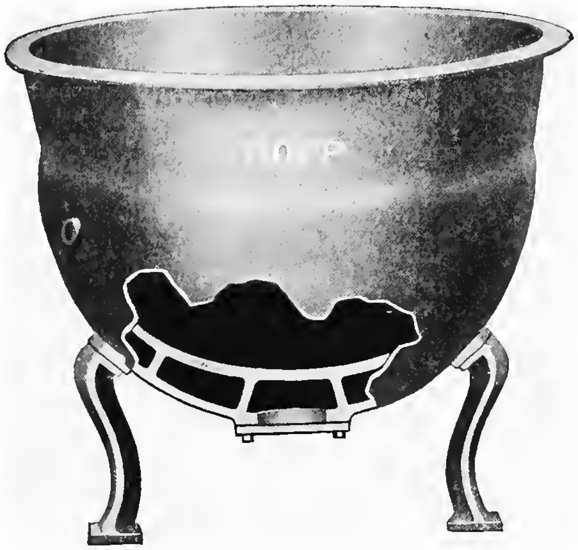
An experimental laboratory press is a necessity in every laboratory. The difficulty before has been that there are so many different types of Filter Press that no experimental press has, up to the present, filled the requirements. This Press is a combination of all the different types of presses that are being built. It has its own pump and materials can be filtered, washed, treated with chemicals, etc., etc.

SOWERS MANUFACTURING COMPANY

1299 Niagara Street
BUFFALO, N. Y.

PRODUCTS:

Kettles, Steam Jacketed; Mixers, Steam Jacketed; Vacuum Pans; Apparatus made to Special Design.



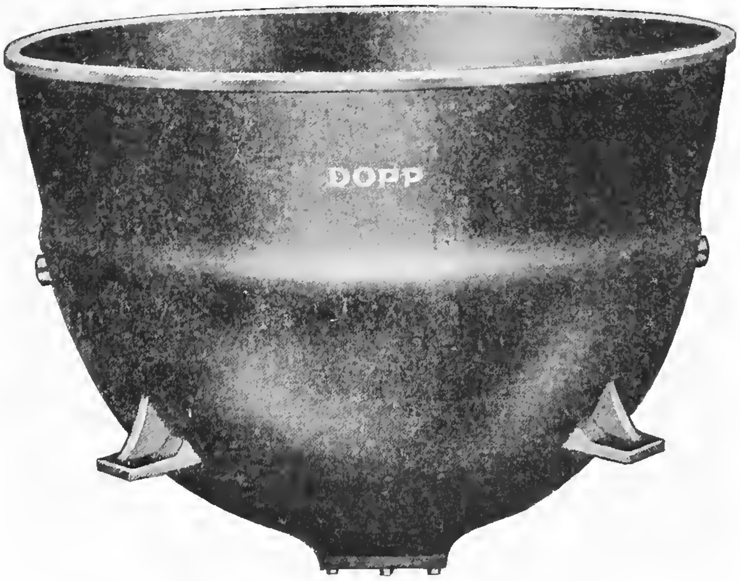
STANDARD TYPE KETTLE WITH LEGS
Regularly made in 5, 10, 15, 20, 30, 40, 50, 65, 80, 100 and 125 gallon sizes

SEAMLESS, ONE-PIECE, LEAKLESS KETTLES

Cast in one piece. Kettle, jacket, staybolts (outlet also when specified), are all in one piece; not put together, but cast complete, all at one time from the one ladle of iron.

Thin shells insure quick heating.

Unusual strength. Dopp Seamless Jacketed Kettles are of unusual strength, due to the staybolts being cast right in the kettle. They not only reinforce the shell, but facilitate the circulation of the steam in the jacket, and hasten the transmission of the heat to the contents.

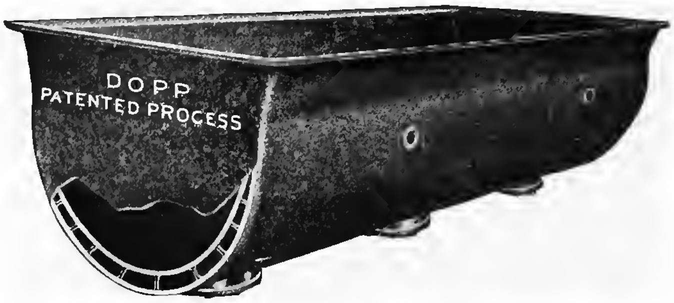


STANDARD TYPE KETTLE WITH LUGS
Regularly made in 150, 175, 200, 250, 300, 350, 400, 500, 650 and 800 gallon sizes

Smooth Castings. Dopp Seamless Kettles are cast by a special process in which the iron does not come in contact with sand at all. This produces an absolutely smooth surface without the necessity of grinding the inner surface, which operation destroys the wearing qualities of a kettle.

Long lasting, because of the simplest possible construction. No bolts or rivets to work loose from contraction and expansion of the metal. Neither kettle nor outlet will ever leak. Dopp Kettles last indefinitely and give constant satisfaction.

Safety is an important factor in steam jacket equipment. The absolute safety of Dopp Seamless Kettles lies in their design, the method of manufacture and the 35,000 pounds tensile strength iron used. Every Standard Kettle is tested to 150 pounds hydrostatic pressure. Special kettles built for higher pressures.

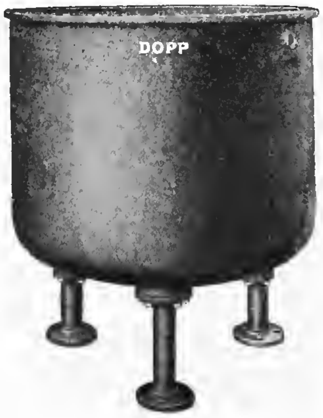


350-GALLON RECTANGULAR TYPE
Inside dimensions: 8′ long; 3′ 6″ wide; 2′ deep. Jacket comes within 7½″ of top. Has 1½″ flange around top.

This makes a kettle of large capacity, yet low and convenient of access. Often fits space to better advantage than a round kettle. Has smooth, seamless surface and no sharp corners. Is furnished with agitator when required.

GUARANTEE:

"We will at any time replace any kettle found defective in workmanship or material upon the old one being returned."



125 GALLON FLAT BOTTOM FULL JACKET

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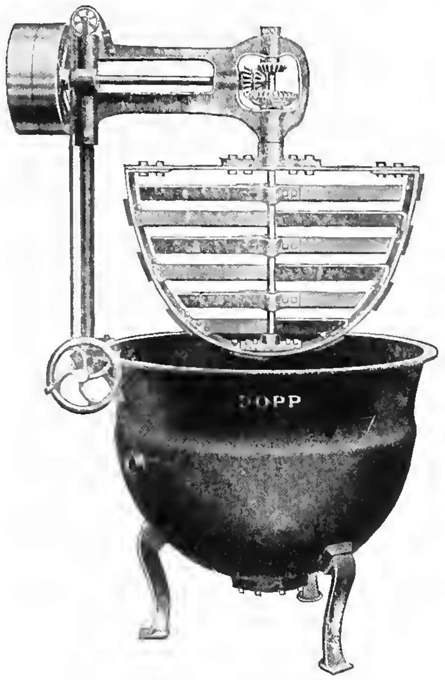
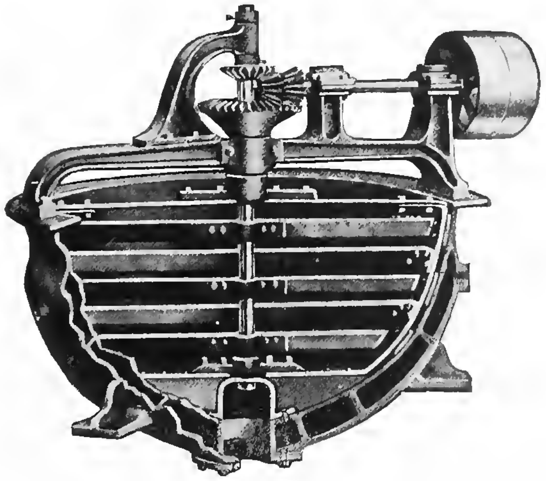
Dopp Cast Iron Seamless Steam Jacketed Kettles are furnished with many different types of mixers, some of which are illustrated on this and the following page. The great variety of patterns which we have enables us to furnish economically apparatus for any substance requiring heat and mixing in its manufacture.



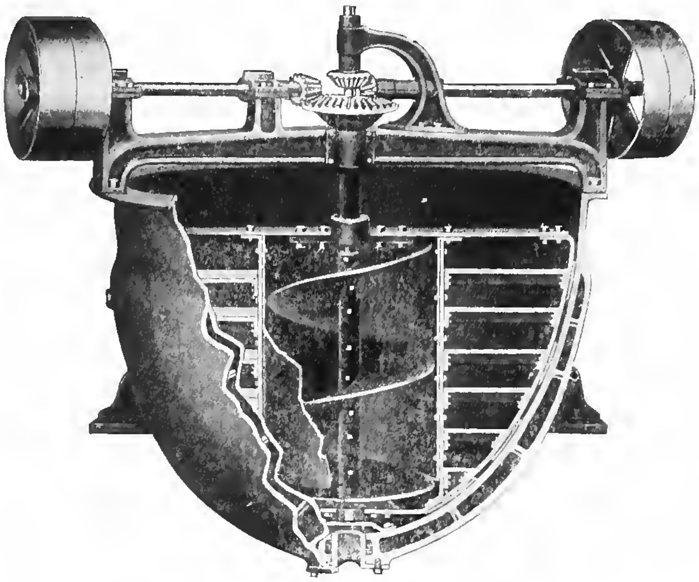
STYLE " D " DOUBLE MOTION BRACKET TYPE AGITATOR
Wrought iron sweep

Made in all sizes from 20 to 100 gallons inclusive, with wrought or cast iron sweep.



STANDARD STYLE " D " DOUBLE MOTION BRIDGE TYPE AGITATOR
Wrought iron sweep

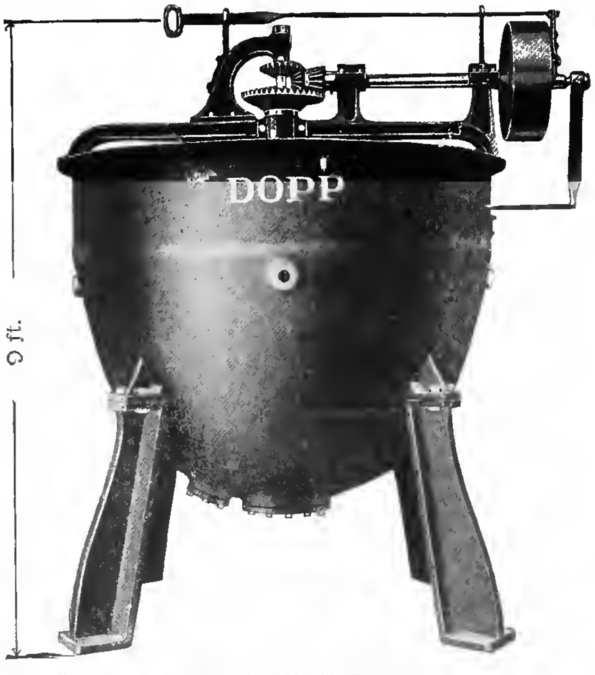
Made in all sizes from 100 to 800 gallons inclusive, with wrought or cast iron sweep.



300-GALLON " A-D " MIXER

Made in all sizes from 100 to 800 gallons inclusive.

This mixer develops a most thorough agitation as two radically different motions of the mass being mixed are obtained. The spiral screw lifts the contents to the top of the mixer while the outside sweep with paddles and drum attached works through the mass and at the same time forces it downward so that it is again caught by the screw. The outside sweep when desired is provided with scrapers which scrape the entire interior jacketed surface of the kettle.



500-GALLON SPECIAL HIGH JACKETED KETTLE EQUIPPED WITH STYLE " D " SELECTIVE DRIVE BRIDGE TYPE AGITATOR

Made in all sizes from 100 to 800 gallons inclusive.

This mixer was designed to enable operator to control degree of agitation. Three combinations are obtained. In each of them the outside sweep with its set of paddles revolves at the desired speed, but by clutch arrangement the paddles on the center shaft can either be revolved in opposite direction to those attached to outside sweep and at twice the speed, held stationary or allowed to float with the mass. In this way is obtained with one unit the action of a double motion mixer, single motion with alternate stationary paddles or single motion only.

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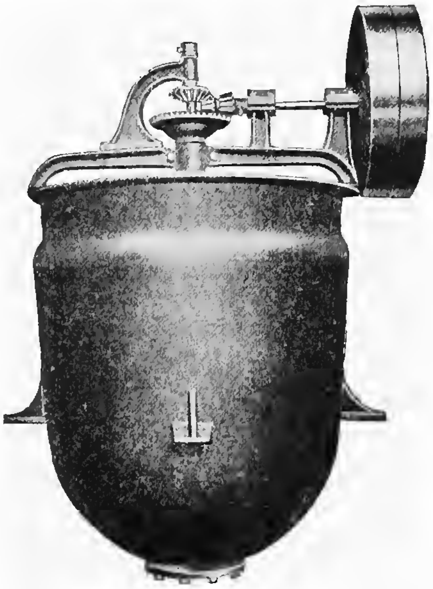
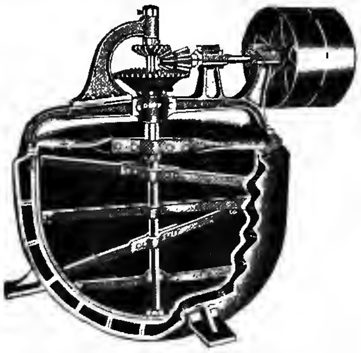
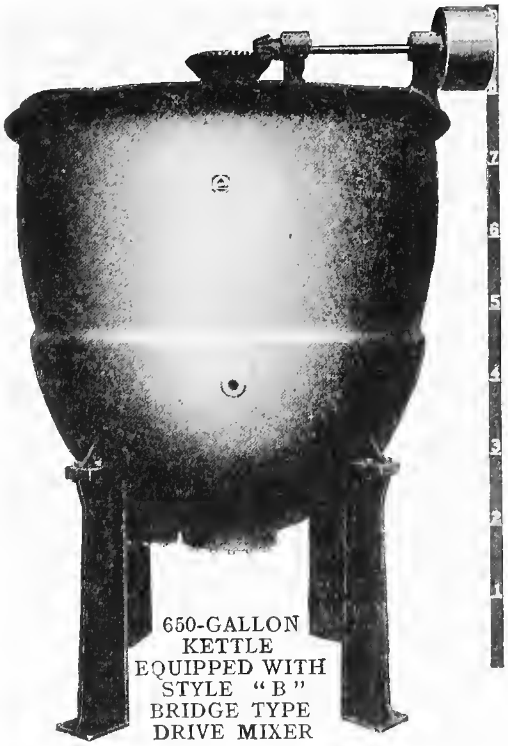


300-GALLON SPECIAL HIGH JACKETED KETTLE EQUIPPED WITH STYLE "D" DOUBLE MOTION BRIDGE TYPE DRIVE MIXER

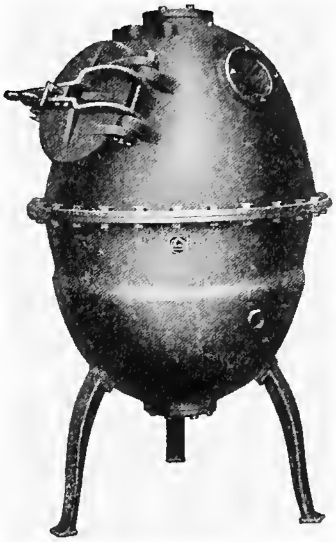


125-GALLON SPECIAL FULL JACKETED KETTLE EQUIPPED WITH STYLE "D" DOUBLE MOTION BRIDGE TYPE DRIVE MIXER



650-GALLON KETTLE EQUIPPED WITH STYLE "B" BRIDGE TYPE DRIVE MIXER

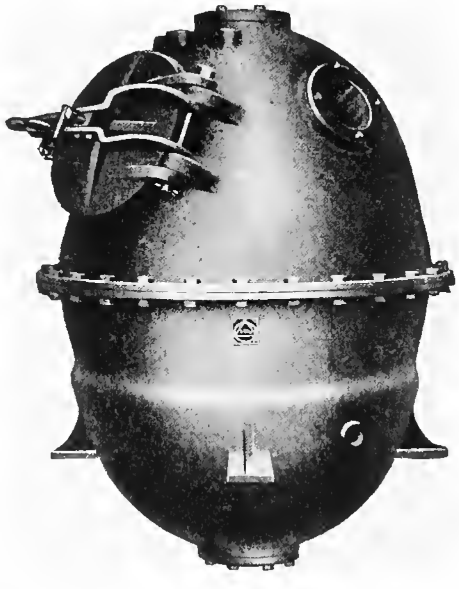
Made in all sizes from 100 to 800 gallons inclusive.



STANDARD "DOPP" VACUUM PAN WITH LEGS

Made in sizes from 10 to 200 gallons (total contents) inclusive.

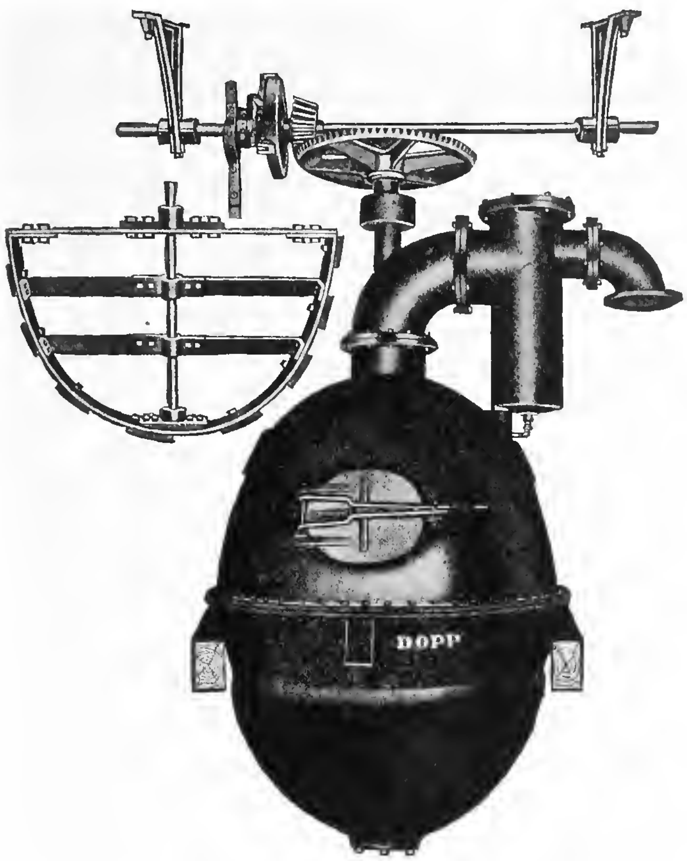
The basis of these pans is the Dopp Cast Iron Seamless Steam Jacketed Kettle used as the lower half. The dome, being practically the same shape as the kettle, makes a very symmetrical and strongly proportioned piece of apparatus. These pans are cast by the same special process as already described on page 248 which makes them particularly well adapted for work where a smooth surface, strength, quick heating or cooling and absolute dryness are necessary.



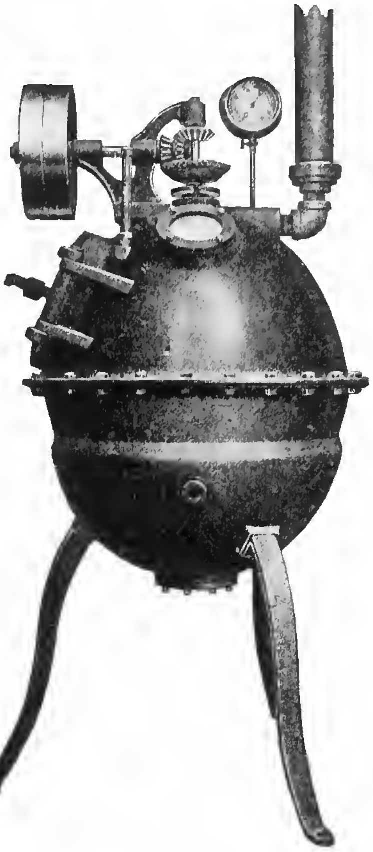
STANDARD "DOPP" VACUUM PAN WITH LUGS

Made in sizes from 300 to 1600 gallons (total contents) inclusive.

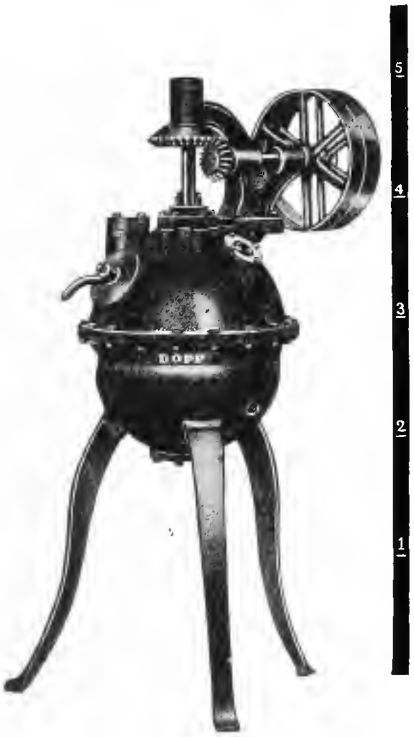
Continued on Next Page



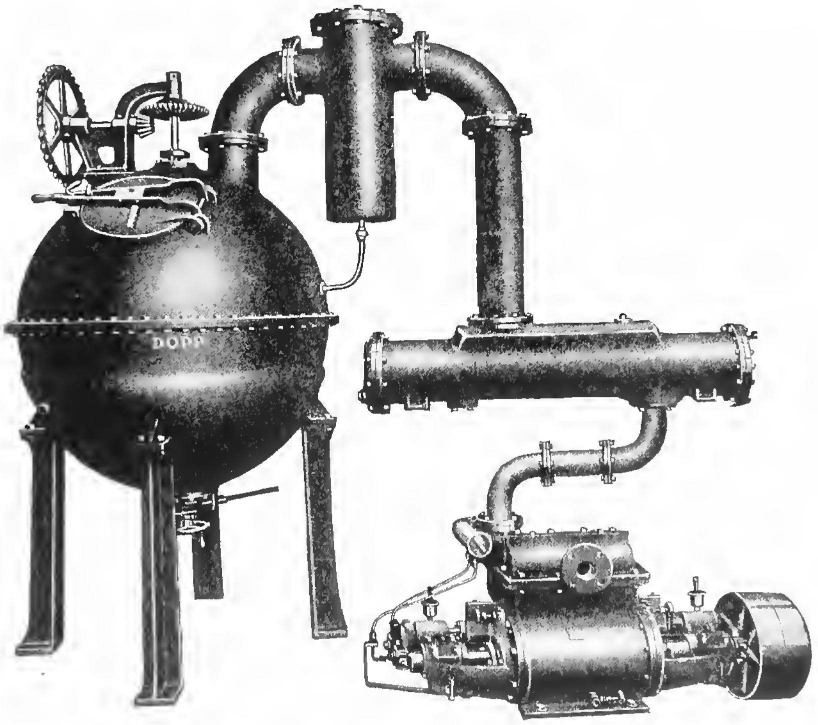
800-GALLON STANDARD DOPP VACUUM PAN WITH OVERHEAD DRIVEN SWEEP AGITATOR



100-GALLON STANDARD DOPP VACUUM PAN WITH BRACKET TYPE BELT DRIVEN STYLE "D" DOUBLE MOTION AGITATOR



10-GALLON STANDARD DOPP LABORATORY VACUUM PAN WITH BRACKET TYPE BELT DRIVEN SWEEP AGITATOR

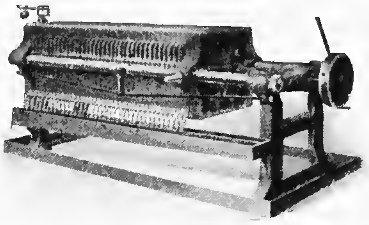


500-GALLON STANDARD DOPP VACUUM PAN WITH BRACKET TYPE CHAIN DRIVEN SWEEP AGITATOR, SAVE-ALL, SURFACE CONDENSER AND PUMP

D. R. SPERRY & CO.

BATAVIA, ILL.
(Near Chicago)

PRODUCTS: Filter Presses; Evaporators; Steam Kettles; Autoclaves.



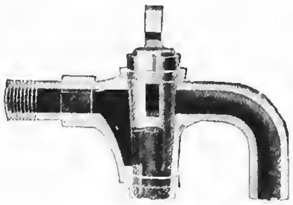
FILTER PRESSES:

The Sperry filter press is made in the following sizes: 10″, 12″, 18″, 24″, 30″, 36″ and 42″.

All sizes can be furnished in iron, wood, lead or brass. Iron is the usual material employed for liquors which are not acid, while wood is successfully used on acids hot or cold. Lead or brass filter presses are used for acids which will attack wood.

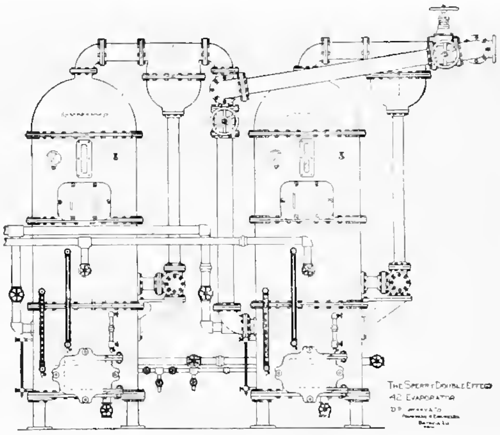
The arrangement within the filter press depends upon the work it is to perform. Recessed plates are used where the cake formed does not exceed 1¼″, while for heavier cakes, frames must be employed. If it is desired to wash the cake in the filter press there are two systems of washing which can be used called "simple" and "thorough." Separate inlets and outlets for wash water can be provided while the discharge for filtrate can either be through cocks or through a closed internal channel.

For liquids which must be filtered hot, hollow plates into which steam is fed can be supplied. The connection for steam into the interior of the plates is made internally, thus eliminating the old style external flexible connections.



The filter press cock shown above is an exclusive Sperry feature used in connection with the Sperry double gutter. By turning the plug to a certain position the first cloudy runnings can be caused to flow out of the bottom of the plug into the side of the double gutter which is piped back to the crude supply. As soon as the clear liquor appears the plug is again turned, causing the cock to discharge in the usual manner into the clear side of the gutter. At another position of the plug the flow is cut off from both outlets. These cocks can be furnished in iron, brass, lead or acid proof metal.

For solving filtration problems we maintain a laboratory in which problems of this character are solved scientifically.



EVAPORATORS:

The Sperry multiple effect evaporator is made in three sizes, 32″, 42″ and 54″. These are very efficiently made and are capable of handling large quantities of liquids.

STEAM JACKETED KETTLES:

Sperry Steam Jacketed Kettles are made in 12 sizes from 5 gallons to 300 gallons. They can be provided with special outlets or with agitators. These kettles are made of cast iron and the inner kettle is renewable. Most of the sizes can be furnished white enameled inside.

AUTOCLAVES:

We make a number of different styles of this apparatus and can build them to suit individual requirements.

E. R. SQUIBB & SONS

Manufacturing Chemists Since 1858

NEW YORK

Address All Communications to E. R. SQUIBB & SONS, New York

PRODUCTS: Test Solutions; Volumetric Solutions; Indicators; Test Papers and the following Analyzed Reagents:

Acid Acetic Glacial
Acid Acetic Anhydride
Acid Boric (Crystals)
Acid Chromic
Acid Citric
Acid Gallic
Acid Hydrobromic (34%)
Acid Hydrochloric Conc. (36%)
Acid Hydrochloric (25%)
Acid Hydrofluoric (42%)
Acid Molybdic (85%)
Acid Nitric Conc. (69%)
Acid Nitric (25%)
Acid Oxalic
Acid Phosphoric (88%)
Acid Phospho-Tungstic
Acid Sulphuric (98%)
Acid Sulphurous
Acid Tannic
Acid Tartaric (Pb Free)
Alcohol, Anhydrous (99.97% by vol.)
Alcohol, Methyl (99.5% by wt.)
Aluminum-Ammonium Sulphate
Aluminum Nitrate
Aluminum-Potassium Sulphate
Ammonia Water Conc. (28%)
Ammonium Carbonate (Cubes)
Ammonium Chloride
Ammonium Chromate
Ammonium Molybdate
Ammonium Nitrate
Ammonium Oxalate
Ammonium Persulphate
Ammonium Phosphate (Dibasic)
Ammonium Sulphate
Ammonium Sulphocyanate
Antimony-Potassium Tartrate
Arsenic Trioxide
Asbestos Wool, Purified
Barium Acetate
Barium Carbonate
Barium Chloride
Barium Hydroxide
Barium Nitrate
Benzol (Benzene)
Bismuth Nitrate (Crystals)
Bismuth Subnitrate
Cadmium Iodide
Cadmium Sulphate
Cadmium-Potassium Iodide
Calcium Carbonate (Precipitated)
Calcium Chloride (Crystals)
Calcium Oxide (from Reagent $CaCO_3$)
Carbon Bisulphide
Carbon Tetrachloride
Chloroform
Cobalt Chloride
Cobalt Nitrate
Copper Sulphate
Ether
Ether, Anhydrous
Ferric-Ammonium Sulphate
Ferric Chloride
Ferrous Sulphate
Iodine, Resublimed
Lead Acetate
Lead Nitrate
Lead Oxide, Red
Lead Oxide, Yellow
Lead Peroxide (Manganese-free)
Magnesium Chloride
Magnesium Sulphate
Manganese Dioxide (Precipitated)
Manganese Sulphate
Mercuric Bromide
Mercuric Chloride
Mercuric Oxide, Red
Mercury
Nickel-Ammonium Sulphate
Nickel Nitrate
Nickel Sulphate
Potassium Acetate
Potassium Bicarbonate
Potassium Bichromate
Potassium Bisulphate (Crystals)
Potassium Bitartrate
Potassium Bromate
Potassium Carbonate (Anhydrous)
Potassium Chlorate
Potassium Chloride
Potassium Chromate
Potassium Ferricyanide
Potassium Ferrocyanide
Potassium Hydroxide (by Alcohol)
Potassium Iodide
Potassium Nitrate
Potassium Permanganate
Potassium Persulphate
Potassium-Sodium Tartrate
Potassium Sulphate
Potassium Sulphocyanate
Silver Nitrate (Crystals)
Sodium Acetate (Crystals)
Sodium Acetate, Anhydrous
Sodium-Ammonium Phosphate
Sodium Bicarbonate
Sodium Bisulphate
Sodium Bisulphite
Sodium Bitartrate
Sodium Borate
Sodium Carbonate (Crystals)
Sodium Carbonate, Anhydrous
Sodium Chlorate
Sodium Chloride
Sodium Citrate
Sodium Cyanide
Sodium Hydroxide (by Alcohol)
Sodium Nitrate
Sodium Nitrite
Sodium Nitroprusside
Sodium Oxalate (Soerensen's Salt)
Sodium Peroxide
Sodium Phosphate (Dibasic)
Sodium Sulphate (Crystals)
Sodium Sulphate, Anhydrous
Sodium Thiosulphate
Stannous Chloride
Sulphur, Washed
Tin (Mossy)
Uranium Nitrate
Zinc (Mossy)
Zinc Sulphate (Granular)

SQUIBB'S ANALYZED REAGENTS:

SQUIBB'S REAGENT

Potassium Carbonate Anhydrous

$K_2 CO_3$

CONTAINS:	IN:	PERCENT.
Chloride as Cl	(100 Gm.)	0.0015
Sulphate as SO_3	(100 Gm.)	0.0003
Nitrate . . .	(5 Gm., diphenylamine)	none
Calcium as CaO.	(100 Gm.)	0.0005
Magnesium as MgO. . .	(100 Gm.)	0.0002
Aluminum as Al_2O_3 .	(100 Gm.)	0.0007
Silica as SiO_2 .	(20 Gm.)	0.008
Iron as Fe	(colorimetric)	0.0003

The figures in parentheses express the quantities taken for each estimation. LOT 16728

E·R·SQUIBB & SONS
MANUFACTURING CHEMISTS, NEW YORK

For many years the Squibb standard of quality has stood for the best that can be produced in the line of drugs and chemicals. To these lines we have added a list of Reagents, prepared from our regular stock of high-grade chemicals by repeated purification. Each lot of chemical is first sampled in order to determine its suitability for reagent purposes. If accepted, all possible impurities present are carefully determined by check analyses. Since the impurities of reagent chemicals are present in very small amounts, we employ quantities sufficiently large to insure accurate quantitative results. The usual procedure consists in applying tests on a quantity of from 10 to 20 gm. of the reagent chemical, and if no appreciable reaction is obtained "none" present is reported. If, however, there is the slightest indication of a reaction, then a suitably large quantity of the material is taken in order to obtain a satisfactory weighable result. With such reagents as are employed in relatively small quantities, we usually take 10 gm. of the sample; while with others, such as sodium carbonate, or ammonium oxalate, which are used in larger amounts in analyses, we take from 25 to 100 gm. for each determination. The average percentage of impurity found is expressed on the label in the nearest higher round number. For foreign metals, such as react with hydrogen sulphide or ammonium sulphide, samples ranging from 5 to 10 gm. are tested, and if an appreciable reaction is noted a sufficiently large quantity is taken and the impurities determined and stated on the label.

SQUIBB'S REAGENT

Alcohol, Anhydrous

$C_2H_5.OH$

Specific Gravity (15.6°C.), 0.7942

CONTAINS:		PERCENT.:
Alcohol	by volume*	99.97
Residue	(100 Cc.)	none
Fusel Oil	(20 Cc.)	none
Aldehyde. .	(20 Cc.+$AgNO_3.NH_3$ test, 24 hrs.)	none
Furfural	(20 Cc.)	none
Oxidizable Impur.	(20 Cc.+1 drop N/10 $KMnO_4$,5 minutes)	none none

*When bottled.

The figures in parentheses express the quantities taken for each determination. LOT 20746

E·R·SQUIBB & SONS
MANUFACTURING CHEMISTS, NEW YORK

STURTEVANT MILL COMPANY

OFFICES AND WORKS
Harrison Square - - - BOSTON, MASS.

LONDON E. C.
147 Queen Victoria St.

NEW YORK
114 Liberty St.

CHICAGO
Peoples Gas Bldg.

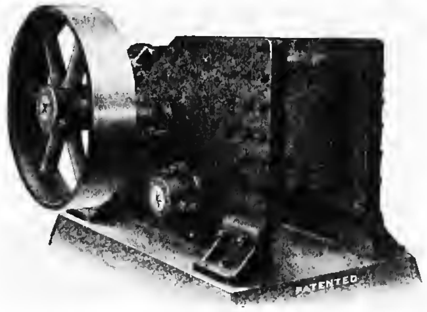
DENVER
316 Colorado Bldg.

PITTSBURGH
2011 First Nat. Bank Bldg.

Cable Address: "EMERYSTONE, BOSTON"—Lieber, Western Union and Private Codes.

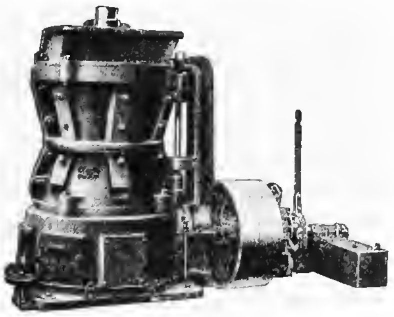
PRODUCTS: Crushing, Pulverizing, Grinding, Screening, Sampling, Elevating, Mixing, and Weighing Machinery.

CRUSHERS:



Jaw Type:—For Coarse, Intermediate and Fine Crushing, Plate Steel, Cast Steel and Cast Iron Construction. Blake, Dodge and Roll Jaw Actions. Cam and Roll Designs. Sizes: From 2″ x 6″ to 12″ x 26″. Catalogue No. 62.

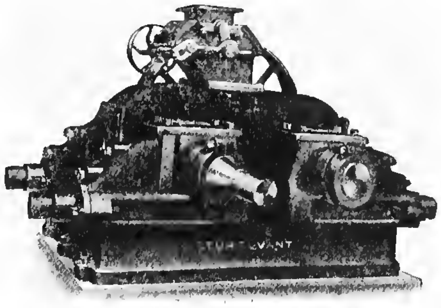
Rotary Type (not Gyratory):—For the fine reduction of soft and moderately hard materials such as Lime, Gypsum, Talc, Soapstone, Clay, Coal, Caustic Soda, Salt, etc. Open Door, accessible construction, Hand Wheel adjustment, Crushes from 8″ to ¼″ or coarser if desired. Catalogue No. 63.



PATENTED

ROLLS:

For Crushing, Pulverizing and Granulation. Coarse or fine work.



PATENTED

BALANCED CRUSHING ROLLS

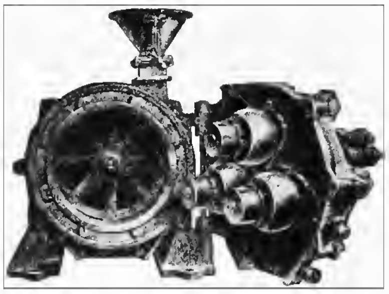
Balanced construction. Springs back of all four bearings give instant relief under breaking pressures. Shocks quartered. Automatic adjustments. Sizes 8″ x 5″ to 38″ x 16″. Catalogue No. 65.

BREAKER FEEDERS:

For the breaking up of caked material or of soft substances from large sizes to 1½″ to 4″ in size to feed to Elevators or Pulverizing Machinery. Two styles, single and double roll, and several sizes. Catalogue No. 87.

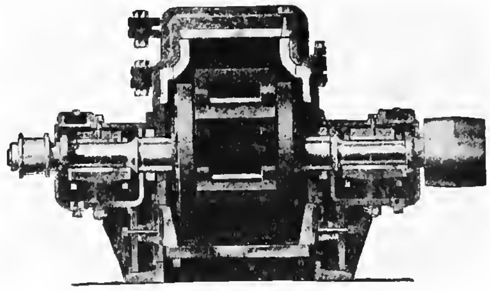
PULVERIZERS:

Ring-Roll Mills:—For grinding hard, medium or soft materials from 2″ to from 10 to 100 mesh. Used lragely for grinding cement-clinker, limestone, ores, granite, trap, phosphate, clay, shale, iron borings, feldspar, etc. Slow speed, durable and accessible. Wearing parts are Ring and Rolls, easily and quickly replaceable. No clogging, no internal screens, no shields or scrapers. Large capacity per horse power and low upkeep. Five sizes: Capacities from 1 to 25 tons per hour. Catalogue No. 70.



PATENTED

HAMMER-BAR MILLS:



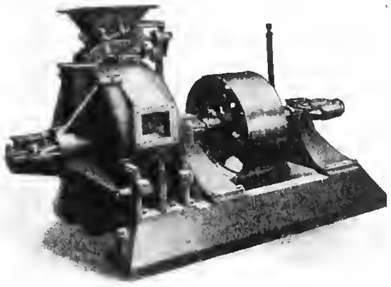
PATENTED

Hammer-Bar Mills:—For Pulverizing Limestone, Clay, Shale, Chemicals and other soft or moderately hard materials to from 8 to 20 mesh without screens. Two sizes. Catalogue No. 84.

Continued on Next Page

Hinged-Hammer Pulverizer:—For reducing Salt, Clay, Shells, Fertilizer, Chemicals and other soft or fibrous materials to from ¼″ to 20 mesh. A high speed, inexpensive mill having large output with small power. Three sizes. Catalogue No. 87.

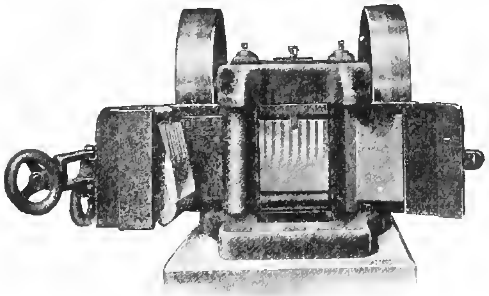
Emery Mills:—For the fine grinding of Talc, Soapstone, Gypsum, Lime, Facings, Colors, Graphite, Clay, Shale, Coal and most soft and moderately hard substances to a fine powder without the use of screens. Economical in power, small upkeep, accessible. Built in Vertical and Horizontal form and in many sizes. Catalogue No. 64.



VERTICAL AND HORIZONTAL ROCK EMERY MILLS

SAMPLING AND LABORATORY MACHINERY:

Automatic Coal Crusher and Sampler:—For crushing and automatically sampling coal preparatory to analysis. Takes coal 3″ in size, crushes it to ¼″ and finer, and at the same time automatically removes 5, 10 or 15% of the amount passed through. This sample is an accurate representation of the whole and is ready for the chemist to analyze. Used by large power plants which buy coal on a B. T. U. basis. Catalogue No. 85.

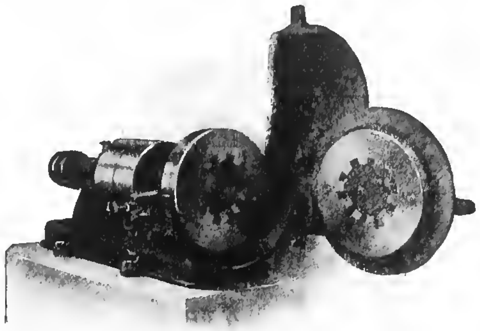


PATENTED

Laboratory Crushers:—For crushing any Rock or Ore from 1″ to 3″ size to cracked corn size and finer. Easy to clean, require from 1 to 2 h.p. Capacities from 100 to 600 lbs. per hour. Two sizes, jaw openings, 2″ x 4″ and 2″ x 6″. Also larger sizes, 4″ x 8″ and 5″ x 10″. Catalogue No. 67.

Laboratory Crushing Rolls:—Crush hard or soft rocks and ores from ½″ to 8 mesh or even as fine as 40 mesh. Usually installed to reduce crusher outputs finer. Two sizes, 8″ x 5″ and 12″ x 12″. Capacities from 200 lbs. to 1 ton per hour. Automatic adjustments, immediately accessible for cleaning. Catalogue No. 67.

Sample Grinders:—For the fine grinding of rock and ore samples. Pulverizes to 80 or 100 mesh or coarser. Open door construction for accessibility and thorough cleaning. Capacity from 50 to 200 lbs. per hour. Power, 3 h.p. Catalogue No. 67.

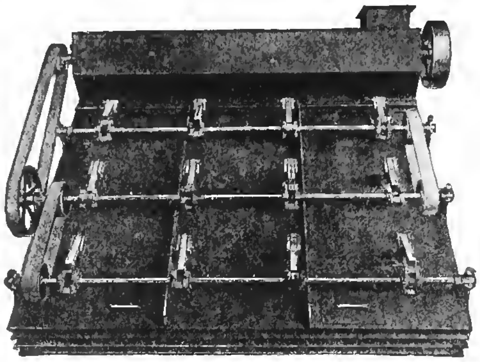


PATENTED

SCREENS:

Laboratory Screen:—For sizing samples. Catalogue No. 67.

Newaygo Inclined Vibrating Separators for screening everything screenable from ½″ to 180 mesh. More than 4000 in use. Newaygo Screening principle: Inclined screen surface, adjustable angle to regulate flow, wire stretched taut and automatically held taut to prevent sagging; wire reenforced and tapped by hammers which keep screen in constant, rapid vibration, thus ensuring open meshes and large, accurate output. On account of screen inclination heavy gauge wire and large meshes produce fine output, thus wear is reduced to a minimum and clogging is rare. Many styles and sizes to suit most every condition. Catalogue No. 77.



PATENTED

SCALES, AUTOMATIC-ELECTRIC:

For Grain, Fertilizer, Rice, Feeds, etc. Simple, durable and accurate. Operated by 3 dry cells, which last from 3 to 6 months. Range of work from ¼ lb. to 200 lbs. Catalogue No. 81.

DRY MIXERS:

For mixing fertilizer or other dry ingredients in batches from ½ to 1 ton. Capacities from 10 to 30 tons per hour. Catalogue No. 80.

FERTILIZER MIXING UNITS:

Consisting of Elevators, Mixer, Pulverizer, Screen, Automatic Scales, Chutes, Feeders, complete ready to set up. All Steel Construction, Practically Dustless and Fireproof. Catalogue No. 86.

SWENSON EVAPORATOR COMPANY

CHICAGO, ILL.

Cable Address: "EVAPORATOR, Chicago," Western Union Code.

PRODUCTS: Evaporators, Single and Multiple Effect; Vacuum Pans; Leaching Batteries; Beet Sugar Machinery; Pulp Mill Machinery; Special Chemical and Waste Product Machinery.

SUBSTANCES HANDLED:

Following is a partial list of the many products economically concentrated in our evaporators:

Sugar
Glucose
Glycerine
Milk Whey
Malt Extract
Tomato Pulp
Beef Extract
Distillery Slop
Steffens Water
Wool Scourings
Glue
Pepsin
Gelatine
Fertilizers
Garbage Water

Distilled Water
Sorghum Syrup
Tartaric Acid
Black Liquor
Sulphite Waste
Salt
Potash
Bittern
Caustic Soda
Zinc Chloride
Calcium Chloride
Magnesium Chloride
Sodium Carbonate
Ammonium Chloride
Sodium Benzo-Sulphonate

RANGE OF SIZES:

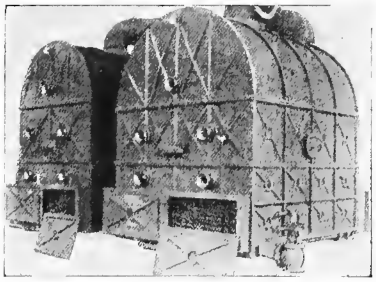
Swenson Evaporators are regularly built in sizes ranging from 100 to 10,000 gal. per hour evaporation.

TYPES OF EVAPORATORS:

Standard Swenson Type,
Seco Basket Type,
Standard Vertical Tube Pans,
Swenson-Type K-Semi-Film,
Seco High Concentration Type,
Special Types—to meet exceptional demands and produce unusual results.

STANDARD SWENSON TYPE:

This type is made for low pressure and vacuum evaporation, in single, double, triple and quadruple effect—for straight concentration of liquors. Horizontal removable tubes are used as a heating surface.

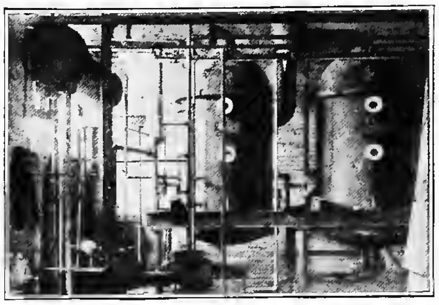


SECO PATENTED BASKET TYPE:

This type is made for high pressure or vacuum evaporation, single or multiple effect, and is designed for concentrating heavy liquids, scale forming liquids or where a precipitation of crystals or other solids occurs. A vertical tube arrangement is employed.

STANDARD VERTICAL TUBE PANS:

This design (for large installations) can be equipped for crystallizing solutions and also for straight concentration work. All pans are fitted with our patented vapor and steam device giving a perfect uniform distribution of vapor to all the tubes, thereby increasing the amount of work possible with a given tube area.



SWENSON-TYPE K-SEMI-FILM.

This is a newly patented type and is an entire innovation. It is especially suitable for handling foamy liquors and has the additional advantage that it gives a very high circulation of the liquor and complete circulation of steam. It further allows the removal of non-condensable gases without loss of economy. No pumping of liquor. Any desired final density usually maintained.

SECO HIGH CONCENTRATION TYPE:

This is one of our latest and most important developments. With this apparatus solutions, either crystallizing or viscous, can be economically concentrated to a much heavier condition than is possible in any commercial equipment previously offered. It is simple in operation, easy to clean, and produces uniform results.

SPECIAL TYPES:

The Swenson Evaporator Company by no means confines itself to the standard types of evaporators. On the contrary our Engineers are constantly employed in converting the conventional apparatus to meet peculiar conditions and produce specific effects. Where our standard units are not adaptable we build special apparatus to more economically meet the demands.

MULTIPLE EFFECT EVAPORATORS:

Multiple effect evaporation is accepted as the most economical method of removing large quantities of water with exhaust or live steam. Steam economy is inversely proportional to the number of effects; for example, a triple effect will remove practically three times as much water with one pound of steam as can be boiled off in an open tank and furthermore permits the use of exhaust steam.

MATERIALS OF CONSTRUCTION:

There has been considerable contention in the past few years in regard to the best chemical resistant metals and other materials to employ in the construction of different apparatus. Our Engineering Department is in a position to furnish certain data on this subject from many years of observation and actual tests. We can usually employ your choice of metals for chemical resistance.

Continued on Next Page

ORIGIN AND DISTRIBUTION:

Contrary to an erroneous impression the Swenson Evaporator is distinctly an American product having its initial development in the manufacture of American cane sugar. It has grown in scope and variety of application with the great American evaporating business, and is to-day making possible new American industries.

Swenson evaporators have a wide distribution and are now in service in England, Australia, Italy, Mexico, South America, Asia, the Provinces of Canada and throughout the United States.

SOME OF OUR CUSTOMERS:

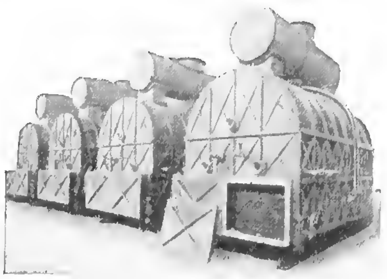
Following is a very abbreviated list of our customers. It will be a pleasure to send the names of some of our clients in your neighborhood and explain why we are getting all of the business from the largest users of evaporators.

Columbia Chemical Co.
Penn. Salt Mfg. Company
Potash Products Company
Mineral Products Co.
Utah Chemical Company
Diamond Match Company
Saginaw Chemical Co.
American Steel & Wire Co.
Stanley Works
Aetna Chemical Company
Barrett Mfg. Company
Chattanooga Chemical Co.
Newport Hydro-Carbon Co.
Procter & Gamble Co.
Cuban American Sugar Co.
Michigan Sugar Company
Clinton Sugar Refining Co.
American Maize Products Co.
David Berg Distilling Co.
Detroit Edison Company
National Milk Sugar Co.
Liebig's Extract of Meat Co.
West Virginia Pulp & Paper Co.
Wausau Sulphate Fibre Co.
Robeson Process Company
Hampton Company
American Trading Company
Armour & Company
Swift & Company
Cudahy Pkg. Company
American Glue Company
Eastern Tanners Glue Co.
U. S. Glue Company
N. K. Fairbank Co.
B. J. Johnson Soap Co.
Peet Bros. Mfg. Company

ENGINEERING IMPORTANCE:

Correct engineering principles are absolutely imperative in evaporation plants. As competition becomes keener this fact becomes more and more important and yet we frequently note a tendency to disregard this prime consideration. It is a false economy to experiment when the results of the best chemical engineering experience are at your command.

The Swenson Evaporator Company represents the oldest evaporator engineering organization in America. Our files and records contain practically the entire history and data of the American evaporator business. The feasibility of many experiments and tests is merely a matter of reference. This organization has introduced many special designs and important improvements, the latest and most noteworthy of which is the above mentioned Seco High Concentration Type for high density work.



We know the actual results that have been secured from nearly 1000 Swenson installations. This information covers practically every solution in commercial quantity.

Write us of your problems or of the results desired and our Engineers will gladly co-operate with their organized knowledge gained through many years of experience—and wholly without obligation on your part.

DATA REQUESTED:

Please cover the following points as completely as possible, as careful attention in submitting information may save needless correspondence. All information treated strictly confidential.

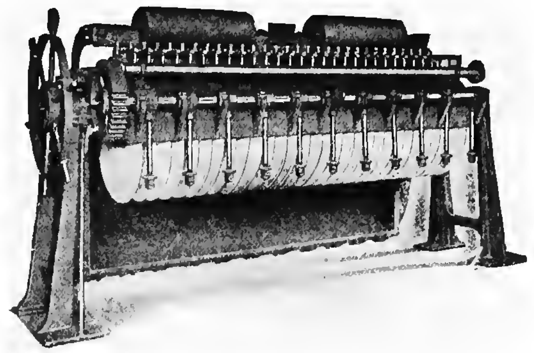
1. Analysis of liquor. If not available send sample.
2. Quantity to be handled in the evaporator.
3. What will be the average initial density (specific gravity, Beaumé, Twaddell, or percentage of solids)?
4. What final density or condition is desired?
5. What is the initial temperature?
6. Are there any marked effects or changes of properties produced by temperature changes?
7. What are the boiling points at atmospheric pressure of the dilute solution and the same solution at the final state of concentration which you wish to reach?
8. State any peculiar properties such as tendency to foam, entrain, evolve gases, become viscous, deposit crystals, sludge, etc.
9. Are there any scale forming ingredients, such as sulphate of lime, phosphate of lime, silica, etc.?
10. What steam is available for evaporation purposes, live or exhaust? Will it be necessary to install a boiler?
11. In what quantity is water available to operate a condenser? What is the source of the water and at what temperature can it be obtained? State quality of water.
12. Include any other information that might be deemed helpful.

OVER HALF OF OUR ORDERS ARE REPEAT ORDERS.

THE SWEETLAND FILTER PRESS CO., Inc.

SPERRY BUILDING
BROOKLYN, N. Y.

PRODUCTS: Self-Dumping Filter; Metallic Filter Cloth.



THE SWEETLAND SELF-DUMPING FILTER (Patented):

The principle upon which the Sweetland Filter is operated is very simple.

In old-fashioned filter presses the solid matter in suspension is deposited in a series of cells or chambers. This makes it necessary to open the several chambers and clean each one individually by hand. In the Sweetland Filter the object is to deposit the solids not in a chamber, but in an even layer upon the surfaces of a plurality of filter leaves so spaced that adjacent cakes do not touch each other. This reversal of the old principle makes possible two extremely important objects, viz.:—automatic discharge and efficient washing of the cakes.

DISCHARGING THE CAKES:

The method of discharging is very simple. Swinging open the filter and "reversing the current" through the leaves is all that is necessary. (See illustration.) The time required for discharging varies with the size of the filter and the nature of the material. For instance, some large machines which dump eighty cubic feet of cake at a charge require only five minutes to open, dump and close, ready for the next charge.

SPECIAL FILTERS:

Where the solution to be filtered is of such a nature that the casting would be attacked, as with acids, etc., special type filters are made which are lined with lead, copper or bronze as the case may require.

ADVANTAGES OF THE SWEETLAND SELF-DUMPING FILTER:

Self-dumping; high washing efficiency; requires very little labor; readily accessible leaves; convenient to operate; great capacity per unit of filter area; no internal moving parts; economical in its use of filter cloth; repairs and renewals can be made in a fraction of the time required by other filters; filter leaves all alike and interchangeable; is adapted to the use of both cotton and metallic filter cloth; operator can see and control the output of each leaf separately. It requires very little floor space. Excess solutions are reduced to a minimum or entirely eliminated—no dead space in filter chamber. Filter leaves convenient in size—convenient to handle. Filter body made of castings, heavy and durable and much less subject to corrosion than steel—leaves may be acid-treated in place. Simple in construction and very easy to operate.

USES:

The Sweetland Self-Dumping Filter finds use in chemical industries, metallurgical plants, beet sugar factories, cane sugar factories, sugar refineries, color manufacturing plants, oil refineries, packing houses, manufacture of food products and wherever an efficient filtering machine is required.

SWEETLAND'S PATENT METALLIC FILTER CLOTH:

Sweetland's Patent Metallic Filter Cloth is alkali proof, resistant to most dilute acids, fire proof, many times as strong as ordinary filter fabrics, easier to handle and easier to clean. It is capable of filtering chemicals that would cause ordinary fabrics to disintegrate almost instantly, and capable of lasting years where ordinary filter cloth last weeks or months.

This metal cloth used in connection with the Sweetland Self-Dumping Filter makes an all metal machine. A sample will be gladly mailed on request.

ENGINEERING SERVICE:

Our ten years' experience in the manufacture of filtering machinery has brought us in contact with practically all kinds of filtration problems. If you are considering the installation of a filter, our competent staff of engineers and chemists will be pleased to study your problem and assist you in determining the size and type of filter required. Tests and demonstrations will be conducted in the presence of your chemist or engineer if desired.

CATALOG:

Catalog No. 12 describes the Sweetland Self-Dumping Filter in detail. We will be pleased to mail you a copy.

E. H. STROUD & CO.

928, 930, 932 & 934 FULLERTON AVE.
CHICAGO, ILL.

ESTABLISHED
1896

CRUSHING PULVERIZING & SHREDDING MACHINERY
TRADE STROUD MARK

PRODUCTS: Crushing, Disintegrating, Pulverizing and Shredding Machinery; Dust Collectors; Air-Vent Chambers; Stokers and Furnaces for Burning Powdered Coal in Locomotives, Stationary Boilers, Stills, Retorts, Kilns, Metallurgical Furnaces, Etc.

CRUSHING, DISINTEGRATING, PULVERIZING AND SHREDDING MACHINERY

For reducing all sorts of dry grindable materials, animal, chemical, mineral and vegetable, and some that carry 6% to 8% or sometimes more of moisture.

STROUD POWDERED COAL BURNER OR STOKER

Receives the Powdered Coal, draws its own supply of air from the atmosphere, measures the coal and air as used, mixes them thoroughly, delivers the mixture to the furnace (where it ignites at once, producing a clean hot flame of bright golden color or of white heat, as desired) and enables the operator to have complete control of furnace temperatures, and to make records from which to duplicate his results at will. We also build a special locomotive powdered coal stoker.

ADVANTAGES:

An oxidizing, reducing or neutral flame, as wanted.

Prevents smoke.

Saves one-third to one-half of hand-fired grate-burned coal.

Saves 15% to 25% of Under-Fire-Stoker-Burned Coal.

Large Saving as compared with burning either Fuel Oil or Producer Gas, or, in some places, as compared with burning Natural Gas.

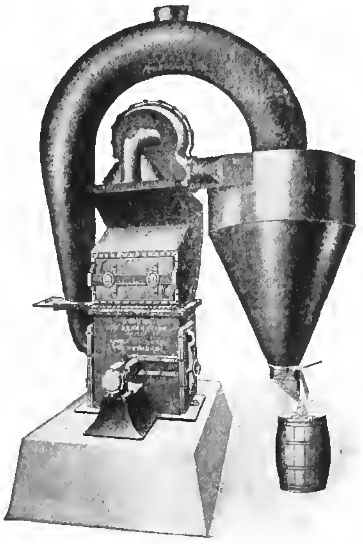
When once adjusted to give the correct mixture, the speed of the burner has only to be increased to give more heat, or reduced to give less heat.

The coal supply can be started or stopped instantly at the will of the operator.

We build many sizes and capacities, from 15 lbs. to 5000 lbs. of coal per hour per burner. We design the combustion chamber, too.

STROUD AIR SEPARATION PULVERIZER:

There are five sizes, all built practically alike, and dustless in operation. A cool pulverizer for crystalline chemicals. It is difficult to clog and easy to clean.



The illustration shows a Pulverizer with a galvanized steel product collector attached to it. We sometimes recommend an air vent chamber too. There are other ways of installing these mills.

This mill gives a finished product direct, which, without subsequent sieving, is so uniformly fine that 90% or 95% or 98% or *all* of it, as wanted, will, if tested when dry, pass through a horizontal brass wire cloth testing sieve of the desired mesh, which can be any mesh from, say, 40 x 40 or 60 x 60 down to the most impalpable powders, far finer than a 200 x 200 mesh.

This is without exception one of the most efficient pulverizers made, and compared with what other machines can do it usually saves its first cost in about one year. To give some idea of its work we give its capacity on bituminous coal.

CAPACITY ON BITUMINOUS COAL

to 100 x 100 mesh, 95% fine, or 200 x 200 mesh, 85% fine.

Size of Pulverizer and its Output in Pounds per Hour

Class 0 8–10 H.P. Feed ½ in. Cubes	Class 1 15–25 H.P. Feed 1 in. Cubes	Class 2 25–30 H.P. Feed 1 in. Cubes	Class 3 40–50 H.P. Feed 2 in. Cubes
650–850	2000–2500	4000–5000	8000–10000

STROUD SCREEN SEPARATION GRINDING MILLS:

Write us for information desired about this type of equipment.

C. J. TAGLIABUE MFG. CO.

18-88 Thirty-Third Street
BROOKLYN, N. Y.

CHICAGO
PITTSBURGH
NEW ORLEANS

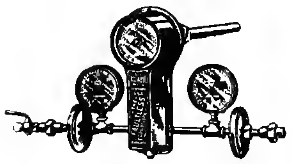
PHILADELPHIA
ST. LOUIS
CLEVELAND
SAN FRANCISCO BOSTON

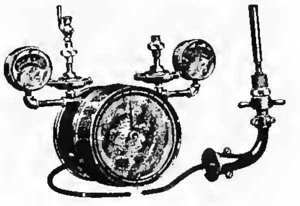
PRODUCTS: Automatic Temperature, Time, Pressure, Vacuum and Liquid Level Controllers; Chemical or Laboratory Thermometers; Recording and Industrial Thermometers; Pyrometers; Gauges; Oil Testing Instruments; Hydrometers; Hygrometers; Barometers, etc.

AUTOMATIC CONTROLLERS:

Roesch-designed, of Perfect, Faultless and Simplex types for purposes enumerated below:

Temperature Controllers—For use at from 40 degrees Fahr. below zero to 750 degrees above, or equivalent; both self-contained and long distance and in various forms.


FAULTLESS TYPE TEMPERATURE CONTROLLER


PERFECT TYPE TEMPERATURE CONTROLLER

Time Controllers: For automatically shutting off the heating or cooling supply entirely, at the end of any time period for which the controller is set.

Pressure Controllers: For maintaining uniform pressures within the limits of as little as 1/25-inch water column, and as high as 400 pounds per square inch.

Vacuum Controllers: For vacuums as slight as 1/25-inch water column and up to 30 inches mercury column.

Liquid Level Controllers: For either open or closed tanks at any elevation, and holding any kind of liquid.

APPLICATION:

All of the controllers are supplied with variations of features, to best adapt them to some particular requirement, such as the following:

Ammonia, Benzol and Light Oil Stills in By-Product Coke Plants of Steel Mills, etc.

Dry Kilns, Dry Heaters, Glue Kettles, Glue Tanks and Glue Spreaders in Wood-working establishments, Piano and Furniture Factories, etc.

Japanning Ovens and Plating Tanks in Automobile Machinery and Hardware Manufacturing Plants, etc.

Feed-Water Heaters, Condensers, Stokers, Blowers, Boiler Feed Level, Superheaters, Gas-Engine Water Jackets, Steam-Pressure Reduction, etc., in Power Plants.

Air Ducts and Ventilating Systems in Mills and Factories.

Dye Tubs, Dye Kettles, Dyeing Machines, Slashers, Steaming Boxes, Bleaching Driers, Drying Cans, Wool Washers, etc., in Textile Mills.

Cold-Storage Rooms, Brine Tanks, etc., in Refrigeration Plants.

Defecators, Juice Heaters, Carbonation Tanks, Vacuum Pans, etc., in Sugar Refineries.

Pasteurizers and Soakers in Breweries, etc.

Oil Stills and Wax Sweaters in Oil Refineries.

Paper Machine Dryers, Sulphite Digesters, Acid Recovery Stills, etc., in Paper and Pulp Mills.

Tanning Vats, Water Heaters, etc., in Tanneries.

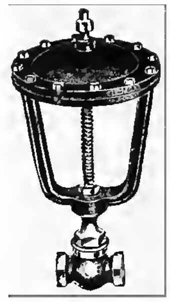
Cooking, Sterilizing, Processing and other apparatus for preparing Food Products.

Tempering Tanks, Proofing Rooms, Storage Rooms, etc., in Bakeries.

Chocolate Machines, Enrobers, Cooling Tables, Pans and Kettles in Confectionery Manufactories.

Scalding Tanks, Boiling Vats, etc., in Meat Packing Establishments.

Dryers, etc., in Clay Product Plants.


DIAPHRAGM-MOTOR VALVE

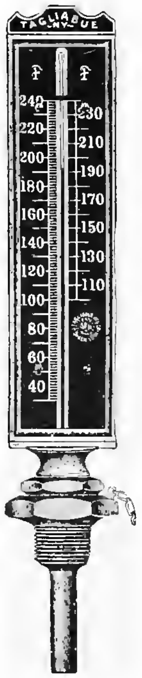
Replaces hand valve and is operated by controller

THERMOMETERS:

Hohmann-type, mercurial thermometers, for all industrial requirements where accuracy is a factor of importance, with scale limits from 60 degrees Fahr. below zero to 1000 degrees above, or equivalent; of various forms and sizes, and provided with various features to best suit the particular requirement of usage. Also other industrial thermometers of less refinement, in great variety of styles. Also miscellaneous thermometers of all types and forms, for every purpose.

RECORDING THERMOMETERS:

For temperatures from 60 degrees Fahr. below zero to 800 degrees above, or equivalent; of self-contained, and long distance forms, in various sizes and patterns, and arranged with numerous special connections and other features for, in each case, recording the temperature with the highest degree of accuracy.



HOHMANN-TYPE THERMOMETER

Straight form, with separable socket connection

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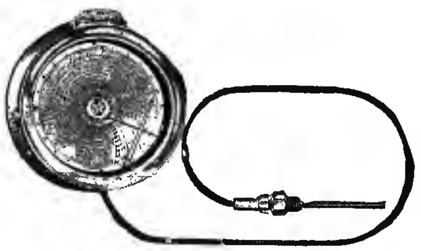


RECORDING THERMOMETER

CHEMICAL OR LABORATORY THERMOMETERS: EXTREME PRECISION GRADE:

For use where extreme refinement of indication is required, such as important laboratory or test work and for checking less accurate thermometers. The care with which they are made, the methods and apparatus employed and the materials used are such that we guarantee them permanently accurate within ½ of a graduation interval.

GAUGES:

Vacuum gauges, draft gauges, etc., of Absolute Pressure, Open Cistern, and Siphon types, in various ranges and styles.

EXPANSION-STEAM PYROMETERS:

For temperatures from 60 degrees Fahr. below zero to 1200 degrees above, or equivalent; of various forms and sizes, and with variations in features as required for best suiting each particular application.

HYDROMETERS:

In endless variety of forms and ranges and of several grades for use in laboratory and industrial work.

HYGROMETERS:

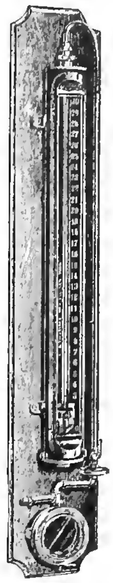
Mercurial hygrometers, stationary and whirling forms, for humidity determinations. Also recording, of same types as recording thermometers.

OIL-TESTING INSTRUMENTS:

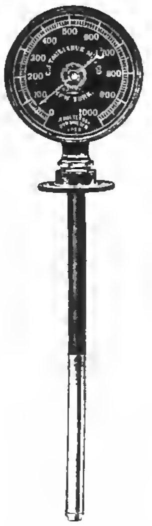
For determining the specific gravity, flash and fire point, boiling point, melting point, freezing point, viscosity, etc., of oil, fat, wax, grease, etc. Hydrometers of various ranges and forms; flash point testers and fire point testers of different styles; boiling point apparatus, freezers, melting point testers and viscosimeters of various styles; jars, tubes, bottles and glasses for test purposes; oil thieves and samples; water indicators; special thermometers; gauge and wantage rods; centrifuges; stills; separatory funnels, etc.

CHEMICAL THERMOMETER

MERCURIAL BAROMETER

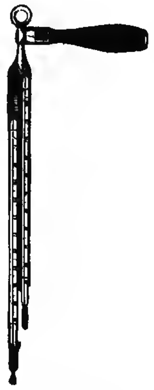


OPEN CISTERN VACUUM GAUGE

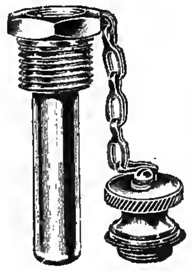


EXPANSION STEM PYROMETER

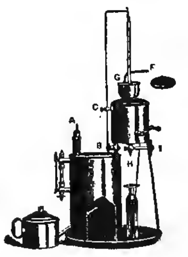
COMBINED FORM HYDROMETER



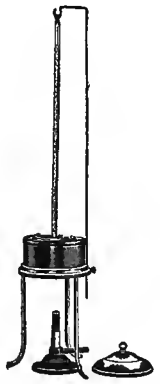
WHIRLING FORM OF HYGROMETER OR SLING PSYCHROMETER



MERCURY WHEEL



VISCOSIMETER



CLEVELAND CUP FOR FLASH AND FIRE TESTS OF LUBRICATING OIL

THE THERMAL SYNDICATE, Ltd.

Chemists' Building, 50 East 41st Street
NEW YORK CITY

Main Office: WALLSEND-ON-TYNE, ENGLAND

PRODUCTS: Vitreosil Dish Cascade Sulphuric Acid Concentration Plants; Nitric Acid Condensing Apparatus; Hydrochloric Acid Cooling and Absorption Systems; Denitration Towers; Acid Distillation Sets; Chamber Plant Details; Parts for Use in Chemical Plants where Resistance to Acids and to High Temperatures is Required; Complete Line of Vitreosil Laboratory Apparatus, Including Combustion Tubes, Test-Tubes, Pyrometer Tubes, Triangles, Plates, Crucibles, Dishes, Capsules, Casseroles, Flasks, Beakers, Muffles, Trays, and a Variety of Special Apparatus made to Order from Customers' Drawings.

GENERAL:

Vitreosil fused pure silica apparatus for works and laboratory use has been thoroughly tried out during the past ten years and has everywhere proved its value as an acid-proof material capable of withstanding high temperatures without breakage.

The material has unvarying physical and chemical characteristics as it results from the fusion of pure silica. In this respect, difficulties which present themselves through the varying composition of acid-resisting alloys are entirely absent.

DISH CASCADE TYPE CONCENTRATION PLANT:

This apparatus consists of a series of open vitreosil dishes supported in refractory seatings and arranged in cascade over a firing flue.

The dishes are directly exposed on their underside to the fire gases and as a result concentration is carried out with minimum fuel consumption.

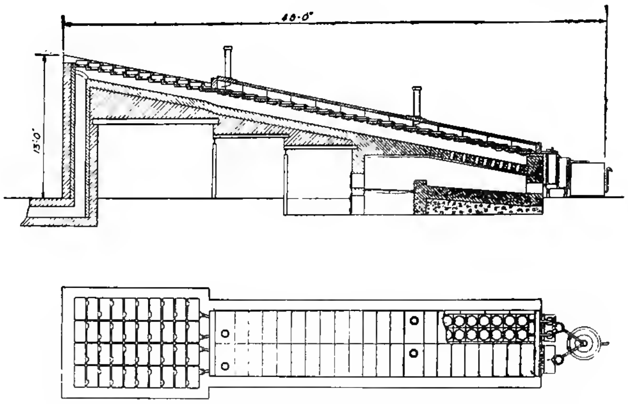
A chamber constructed of the same refractory material as the seatings is arranged over the basins to permit the complete collection of fume and to enable it to be withdrawn to a condensing equipment.

The separation of the fire gases from the acid and the total insolubility of vitreosil in sulphuric acid at all temperatures eliminates the possibility of impurities being introduced at any stage of the process of concentration.

Fuel consumption varies from 16% to 18% of the weight of finished acid, for concentration from 50° Be. to 66° Be.

The advantages of the apparatus are:

1. Small initial cost per ton capacity.
2. Low upkeep and replacement charges.
3. No impurities introduced into acid.
4. Small consumption of low grade fuel.
5. Small quantity of acid to be handled in condensing system.



TEN TON SULPHURIC ACID CONCENTRATOR

NITRIC ACID CONDENSING APPARATUS:

These plants are made up of a series of direct water-cooled "S" bends generally arranged for Reflux working. This type of condensation equipment is very compact, low in first cost and extremely durable, while the grade of acid obtained is of excellent quality.

HYDROCHLORIC ACID COOLING AND ABSORPTION SYSTEMS:

For hydrochloric acid work "S" bends similar to those employed for nitric acid condensation are of value. They are used in batteries for cooling the hydrochloric acid gas prior to absorption and plants can also be arranged so that the absorption takes place in water-cooled vitreosil vessels or "S" bends. Vitreosil hydrochloric acid equipment does not "sweat" under any conditions of usage.

CHAMBER PLANT DETAILS:

The hardness of vitreosil enables tower outlet pipes and lips made of this ware to resist scouring action. Acid inlet pipes for nitre ovens are inexpensive and permanent.

DENITRATION APPARATUS:

Is of the tower type in which the denitration is performed by means of superheated steam.

ACID DISTILLATION SETS:

Comprise the complete equipment exclusive of the setting and consist of the retort with its cover and inlet tube, vapor outlet and condensing tubes.

As all the parts are made of vitreosil there is no possibility of contamination.

Continued on Next Page

EVAPORATING DISHES:

The larger vitreosil dishes are used for the concentration and evaporation of solutions of precious metal compounds, phosphoric acid, tungsten salts, etc. The possibility of loss through breakage is reduced to a minimum.

TUBES FOR INDUSTRIAL USES:

As vitreosil tubes are made up to 4″ in bore and 8′ in length they have found commercial application in such work as organic halogen syntheses, the reduction of tungsten oxide, etc. Tubes are also employed for high tension electrical insulating purposes where the conditions of temperature change and corrosion are severe.

SPECIAL APPARATUS:

Comprises a wide variety of equipment for industrial chemical operations, the uses being based on either the refractory nature of vitreosil, or its complete resistance to acids and to changes of temperature.

LABORATORY APPARATUS:

Vitreosil laboratory apparatus replaces glass and porcelain and also platinum in certain operations.

The sizes and shapes are standard with the regular glass and porcelain shapes, while the nature of the process of manufacture also permits special apparatus to be produced at reasonable cost.

TYPICAL QUOTATION ON PARTS FOR A CONCENTRATOR TO PRODUCE 10 TONS 66° Be. FROM 50° Be. SULPHURIC ACID PER 24 HOURS

100 S.1 Dishes	$9.50	each
10 Delivery pipes	7.50	"
4 Fume pipes	13.00	"
4 Fume pipe fitting pieces	5.00	"
6 Coolers	32.00	"
40 Trays	21.00	"
Approximate total cost erected	$5000.00	

Standard Nitric or Hydrochloric Acid "S" Bend:

No.	Bore, inches	Length between centers, inches	Price, each
N. 1	4	40	$18.25

Glover Tower Lip (to fit inside a 6 in. shaped lead lip).

No.	Diameter, inches	Length, inches	Flange, inches	Price, each
SA. 4	6	18	1½	$6.50

Inlet Pipe for Nitre Oven:

Pipes with taper head, complete with cast iron wall socket.

No.	Diameter, inches	Length, inches	Price, each
SA. 7	2¾	27	$11.00

Denitration Apparatus:

Equipment includes tower 12″ diameter, 10′ high, distributor, steam inlet, gas and acid outlets, $150.00

Acid Distillation Set:

Retort capacity 50 liters $127.50

Evaporating Dishes:

No.	Approximate capacity, gallons	(Inside measurements) Diameter, inches	Depth, inches	Price, each
B. 31	.75	15½	4	$12.00
B. 32	2.65	16	6¾	14.00
B. 33	4.00	18	7	14.00
B. 35	6.00	18	8½	15.00

Tubes (In lengths up to 8 feet).*

Bore, inches	Wall thickness, mm.	Price per ft.
1	1–3	2.50
1¼	2–4	2.90
1½	2–5	3.20
2	2–5	3.90
2½	2–6	5.25
3	2–7	6.50
3½	3–8	7.50
4	3–9	8.00

* Lengths less than one foot 10% extra.

Prices for other Sizes and large Quantities on application.

Pipes (Plain or Socket):

Bore, inches	Max. length, inches	Price per ft.
2	48	$2.50
3	48	3.00
4	48	3.75
5	36	4.25
6	36	4.75
7	36	5.25
8	36	5.75
9	36	6.75
12	36	8.00

Apparatus sold under the registered trademark name of Vitreosil is made by the patented electric furnace process of The Thermal Syndicate, Ltd.

ARTHUR H. THOMAS COMPANY

West Washington Square PHILADELPHIA, U. S. A.

IMPORTERS—DEALERS—EXPORTERS

LABORATORY APPARATUS AND REAGENTS

SELECTED FOR LABORATORIES OF

CHEMISTRY AND BIOLOGY

IN THEIR APPLICATION TO

EDUCATION, THE INDUSTRIES, MEDICINE AND THE PUBLIC HEALTH

INCLUDING SOME EQUIPMENT FOR

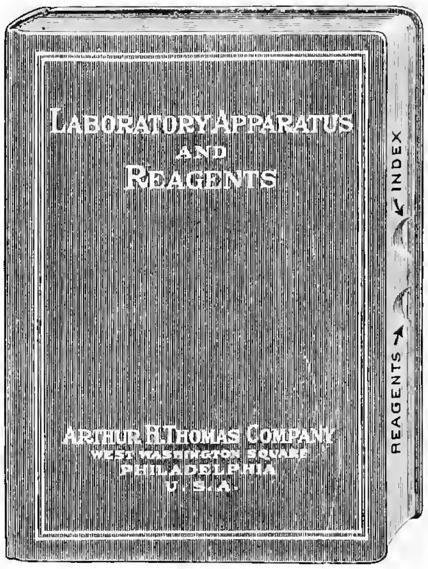
METALLURGY, MINERALOGY, THE TESTING OF MATERIALS AND OPTICAL PROJECTION

PRODUCTS:

- Asphalt and Tar Testing Apparatus
- Bacteriological, Histological and Serological Apparatus
- Balances
- Calorimeters
- Cement Testing Apparatus
- Centrifuges
- Charts
- Color Testing Apparatus
- Crushing, Grinding and Pulverizing Apparatus
- Dissecting Instruments
- Distilling Apparatus
- Electro-Chemistry Apparatus
- Furnaces
- Gas Analysis Apparatus
- Apparatus for Haematology
- Hydrometers and Hygrometers
- Specimen Jars
- Measuring Appliances
- Metallographic Apparatus
- Microscopes and Accessories
- Micro-Photographic Apparatus
- Microtomes and Accessories
- Milk Testing Apparatus
- Apparatus for Mineralogy, Crystallography, Petrography, etc.
- Apparatus for the Determination of Nitrogen
- Oil Testing Apparatus
- Ovens
- Photometers and Accessories
- Physical Chemistry Apparatus
- Physiological and Clinical Apparatus
- Platinum Ware
- Polariscopes and Accessories
- Projection Apparatus and Accessories
- Pyrometers
- Radio-Chemistry Apparatus
- Reagents
- Refractometers
- Shaking Apparatus
- Spectroscopes, Spectrographs, Spectrometers, Spectro-Photometers and Accessories
- Syringes
- Testing Apparatus for Paper, Yarns, Textiles, Rubber, Leather, etc.
- Thermometers
- Urine Analysis Apparatus

While the above is a list of the principal products which we handle, it is also a list of the titles of forty-three different sections of our catalogue of which we have a supply of reprints. While the complete catalogue is sent out only under the terms outlined below, these reprints are sent upon request as long as our supply lasts.

Our Catalogue consists of 656 pages, 8 x 11¼ inches in size, bound in serviceable green cloth. The Apparatus section comprises 585 pages on which are listed 12,356 distinct items illustrated with 3,295 illustrations—mostly new wood cuts drawn directly from the apparatus. In the descriptions an attempt has been made to accurately describe the items without the use of superlatives. A Condensed Index with group arrangement faces page 1 and a very comprehensive general Index is provided at the end of the Apparatus section.



In the Reagent section there are listed 2,305 different chemicals with the Certified, Guaranteed and Typical Analyses of Kahlbaum, Merck and Baker printed under all of the more important high-grade Chemicals. Prices are given in both original and other size packages with cost of containers clearly shown and we believe the arrangement affords the buyer an opportunity to make intelligent choice of Reagents on the basis of both quality and price.

This catalogue is sent gratis only to those whose identity with regularly established laboratory work is fully known to us. Where we have no information as to such connection, or where it does not exist, a charge of $2.50 is made for the catalogue, which amount is credited against the first $50.00 purchase made therefrom.

Our business is confined to the buying and selling of Apparatus and Reagents, mostly within the limits mentioned above. We are not scientists, inventors or manufacturers and we are not equipped to design and experimentally develop scientific apparatus. We believe such work is properly done by the scientist in his laboratory, the manufacturer in his shop, or by the two in cooperation, and that the function of the dealer advantageously begins only after such work is completed. We are ready whenever possible to facilitate cooperation between the scientist with ideas for development and selected manufacturers with facilities applying thereto. We own no patents, have part in no monopolies and all the merchandise offered in our catalogue is obtainable either directly from the makers or through other dealers whenever our services fail in their operation toward the convenience, economy and general satisfaction of the purchaser.

THWING INSTRUMENT COMPANY

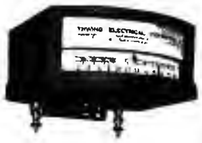
459 North Fifth Street **PHILADELPHIA, PA.**

59 Pearl St., New York, N. Y.

Transportation Building, Chicago, Ill.

PRODUCTS: Electrical Pyrometers, Electrical Thermometers, Millivoltmeters.

ELECTRICAL PYROMETERS:



WALL PATTERN INDICATING PYROMETER

Thwing Electrical Pyrometers are used in stills and furnaces of every description. Thermocouples made of base metal or platinum.

The line of Recording Pyrometers presented on this page is the result of ten years' experience in meeting the demands of Pyrometer users for such records, succeeding over twenty years' use of instruments of precision in teaching and research work in college laboratories. This experience is reflected in the various features of our instrument which make for accuracy of measurement.

In the Thwing service, we make it a point to recommend the type of thermocouple which will prove most satisfactory from every standpoint, viewed from our experience in supplying all lines of industry. Thermocouple and apparatus are adapted to each other and to meet the individual use for which they are sold, not selected from stock at random. Where conditions require thermocouples to measure temperatures which never exceed 800° C., we never recommend an outfit suitable for temperatures as high as 1600° C., but equip your plant just as we would fit a similar one for our own use.

ELECTRICAL THERMOMETERS:

Thwing Electrical Thermometers are used for all temperature measurements which are too low for the practical application of the base metal thermocouple.

RADIATION PYROMETERS:

Thwing Radiation Pyrometers are used extensively in steel mills, coke plants and for experimental work involving temperatures too high for the platinum thermocouple.

What It Is Suitable For:

For measuring the temperature of hot objects in motion, such as:

Flowing Steel. Steel in the Rolls and under the Hammer.

Cement Kilns, giving a continuous, graphic record.

For excessively high temperatures, as Open Hearth Furnaces, the Carborundum Furnace and other arc or carbon resistance furnaces.

Brick Kilns, Lime Kilns, Smelting Furnaces, Coke Ovens, Boiler Fire Pits, etc.

For quick and accurate local temperature measurements, as of dies in the hardening furnace, etc.

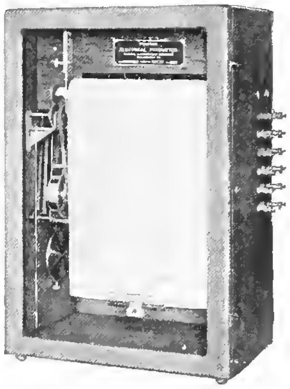
It is not suitable for gases, flames, or other transparent or semi-transparent bodies, and cannot be used where there is much smoke or outrushing flame.

How It Is Used:

The Radiation Pyrometer does not go into the fire, hence it does not have to be renewed. It consists of a tube for collecting the heat rays (both dark and luminous) and concentrating them on a sensitive thermocouple. The tube is pointed at the hot object and in five seconds thereafter the temperature may be read directly in degrees on the millivoltmeter. The latter may be portable, wall type, or recording, as required.

There is no leveling, no focusing, no tedious matching of colors required, no storage battery to keep at a standard voltage, in short it is an instrument of scientific precision so robust and simple that it is in daily use in hundreds of mills.

THWING RECORDERS:



MULTIPLE RECORD RECORDER

As many as 12 records, all clearly distinguishable, can be made with a single recorder on a straight chart. This feature greatly reduces the cost and upkeep. All of our instruments are of the horizontal double pivot, high resistance type and are compensated for variations in room temperature. Made in Fahrenheit or Centigrade graduations as preferred.

Experience has proved that a daily chart is preferable to any other period, as its frequent changing insures careful attention to the apparatus and a prompt delivery of the record to the proper official. However, where desired, continuous tape charts for recorders using charts 5 inches wide will be supplied, or two such charts for recorders using two or four galvanometers on a chart 10 inches wide. We do not build recorders with the dial type chart, as we do not consider that such records are as practical for observation or comparison as those made in approximately a straight line, on our straight charts.

General Catalog No. 8 explains these instruments fully. Write for a copy.

THE TITANIUM ALLOY MFG. COMPANY

General Offices and Works: NIAGARA FALLS, N. Y.

TPC
Reg. U. S. Pat. Off.
TRADE MARK.

NEW YORK
15 Wall Street

PITTSBURGH
Oliver Building

CHICAGO
Peoples Gas Building

BUFFALO
Marine Bank Building

PRODUCTS: Brass and Bronze Castings; Acid-Resisting Alloy Castings; High Conductivity Copper Castings; Bronze Alloys for Special Purposes; Titanium-Aluminium Bronze; Ferro-Carbon-Titanium 15% Titanium.

TITANIUM ALLOYS:

Our Alloys have been selected after careful research, followed by extended service trials, in an effort to cover broadly the range of engineering specifications.

Where special requirements are presented we have a research or experimental foundry department equipped with both coke and electric melting furances and controlled, as is our production foundry, by complete chemical, physical and metallographic laboratories.

The extensive laboratories required by our other departments give this foundry an unique advantage in so far as its ability to cope with unusual requirements is concerned.

The location of this plant at Niagara Falls, N. Y., gives us low power costs, which coupled with our long experience with electric furnace practice enable us to furnish our customers with superior castings at moderate cost.

We make a full line of brass and bronze castings but it is as specialists in the manufacture of high-grade bronzes that we wish to make our appeal to concerns whose requirements are not being successfully met by local foundries.

Experience gained in making difficult bronze castings for varied requirements of many industries throughout the country accounts for our ability to handle your work successfully.

Our organization is prepared to recommend, as a result of research work, the most suitable Alloy for each specific requirement.

In presenting here the approximate compositions of our various Alloys we were influenced by the feeling that purchasers of high-grade Bronzes are entitled to know exactly what they are buying, so that they may be in a position to decide whether or not that particular Bronze is best adapted to their requirements.

PARTIAL LIST OF ALLOYS:

Alloy No. 1. May be used wherever castings of strength or toughness are required. It resists the corrosive action of salt water, tanning and sulphite liquors better than any of our other bronzes. Its physical properties compare closely with those of a Swedish Bessemer steel with .35 carbon.

This bronze is 10% lighter than either yellow brass or manganese bronze, 17% lighter than phosphor bronze and 15% lighter than red brass composition. Its coefficient of friction is .0018.

Alloy No. 3. Commonly known as Stone's English Gear Bronze and extensively used in this country and abroad. It is very serviceable for gears and worm wheels where requirements are severe, especially when quiet running is a desired feature. It should be used against nicely finished high carbon or alloyed steels. While this bronze is very well considered and adequately meets present requirements of all high grade gears, the greater strength, hardness, toughness and the lower specific gravity of our Alloy No. 5 are factors which should be very carefully considered by all users of this type of bronze.

Alloy No. 5. Very similar to our No. 1 but having slightly better machining properties and higher yield point. We recommend this alloy for medium sized castings where great strength and resistance to wear or repeated shock are required. For similar requirements in very large castings, a slightly modified alloy gives superior results. This alloy has a remarkably great endurance to vibratory or alternating stresses, being superior to all other bronzes and even better than steel under severe conditions. It contains 1% of iron.

In machining properties, this alloy and No. 1 must be compared to high tin alloys and not to the ordinary commercial bronzes. The Titanium Aluminum Bronzes are unusually tough and hence somewhat harder to machine.

Alloy No. 9. An acid resisting bronze, used in place of cast iron where acid is present, as in mine pump bodies and other similar locations. It is suitable for thrust collars or discs where high pressure occurs. Like Alloy No. 3, this bronze is often used where compression is a factor, as both are stronger than Alloy No. 15. Where this condition is to be met the bearing surface of either of these alloys must be very carefully prepared so as to prevent scoring.

Alloy No. 10. This is practically the "G" bronze of the Bureau of Steam Engineering of the U. S. Navy Department.

A strong general utility alloy widely known as "Gua Metal"—where heavy pressures and high speeds obtain or for superheated steam, hydraulic work, thrust collars, etc. The absence of granular structure in this alloy has caused it to be widely recommended for high grade bearings where the pressure is heavy and the bearing must not pound out. If so used it must be closely fitted and run against hardened and ground pins only.

Alloy No. 11. An excellent medium soft bronze, extensively used in the automobile industry for small bearings when lined with genuine babbitt. It is recommended for bearings for high speeds and heavy pressures or for severe service steam work. The lead content is sufficient to give this bronze conformability so that if the adjacent part is not closely fitted the alloy should come to a bearing without cutting.

Alloy No. 12. Very similar to No. 11 and ranks between it and No. 18 in cost and physical properties. It is a high grade steam metal, having excellent casting qualities, and its relative softness makes it a good alloy for valves, steam specialties and metal patterns.

Alloy No. 14. A gear bronze which is softer than either Alloys Nos. 1 or 3. The presence of lead makes it machine more easily. It is applicable for gears where the service is not too severe.

Alloy No. 15. The standard phosphor bronze for high speed and heavy pressure. It is one of the most serviceable bearing metals of the so-called phosphor bronzes, and is extensively used for bearings subject to shock and vibration, heavy work and high speeds, such as locomotive cross head bearings, crank pins, bridge bearings, roll necks, mill table, grinder, blower and road machinery bearings. Heavy work of this character is not usually as accurately fitted as small work so that the high lead content of this alloy materially aids in the conformation of the bearing.

Alloy No. 16. This bronze is very similar to Alloy No. 15, the lower tin content making it slightly lower in price. It is also somewhat softer and where service conditions will permit the use of brass ingot in its manufacture a very considerable saving can be effected.

Alloy No. 17. When pressure or shock conditions are not severe this alloy is an economical bearing metal. For ordinary red brass castings it is very satisfactory because of its low cost and excellent machining qualities.

Alloy No. 18. This is a high grade red brass, generally known as the standard "Red Composition," or "Ounce Metal." It is a good steam metal; used widely for pump bodies, valves and similar articles. For general service it is regarded as an excellent bearing metal. In the estimation of the trade it is rated between the red brasses and the cheaper phosphor bronzes.

Alloy No. 19. Commercial Red Brass, recommended where conditions permit the use of a cheaper "Red Metal" than Alloy No. 18. As in Alloy No. 16, if conditions permit, a considerable saving can be effected in the manufacture of castings of this alloy by the use of ingot brass.

Alloy No. 20. A high leaded phosphor-bronze similar to No. 15 but softer. For medium pressures and high speeds, such as are found in electric motor bearings, it is well adapted. The lead content aids lubrication and causes the bearing to conform more readily to the shaft.

Alloy No. 24. A good grade yellow brass which casts well, takes a good polish and is very suitable for light castings, such as ornamental work where strength is not an important factor.

Alloy No. 28. Pure copper for use on electrical installations and for die blocks on electric welding machines. This alloy has high electrical conductivity, due to the special deoxidization. So called pure copper castings are ordinarily accepted with from 1% to 3% zinc and their conductivity runs well under 60%, whereas the conductivity of Alloy No. 28 is over 75% and may run as high as 90%.

Alloy No. 29. This alloy is commonly known as Manganese Bronze and is of value for castings where great strength and toughness are required. Manganese Bronze is one of the two high tensile bronzes, the other being Aluminum Bronze. It is extensively used for propeller blades and hubs, valve stems, engine framing and other parts requiring great strength.

In our opinion Titanium Aluminum Bronze is superior to any manganese bronze for practically all requirements. This opinion is substantiated by many eminent authorities and the only reasons for the more extensive use of manganese bronze have been the well recognized difficulty of making copper aluminum alloys and their higher manufacturing cost. We have successfully overcome both of these difficulties. Alloy No. 29 is not a good bearing bronze. It contains Iron 1%, Manganese 0.5%.

Alloy Number	Approximate Composition per cent.					Physical Properties								
	Copper	Aluminum	Tin	Lead	Zinc	Ultimate Tensile Strength, Lbs. per sq. in.	Elongation, per cent in 2 in.	Reduction of Area, per cent	Sq. Gravity at 20° C.	Brinell Hardness No., 500 kg. for 30 sec.	Shrinkage, inches per foot.	Wt. per cu. lbs.	Compression El. limit, lbs. per sq. in.
1	90	10				70000	20	21	7.5	90—100	.22	.27	19000
3	89		11			35-40000	6—10	7-9	8.5	80	.125	.31	16000
5	89	10				70000	24.5	27.3	7.5	92—96	.22	.27	19000
9	90		10			35-40000	15—18	15-20	8.6	65—70	.125	.31	16000
10	88		10		2	32-38000	14—18	12-15	8.7	70—75	.125	.32	15000
11	90		6.5	1.5	2	34-40000	25—33	26-34	8.8	50—60	.14	.32	13000
12	89		5	3	3	34000	26—31	29	8.9	40—45	.14	.32	11500
14	88		10	2		30-35000	15—20	18-26	8.8	65—70	.125	.32	15000
15	80		10	10		28-32000	5—7	6-10	9.0	55—60	.125	.33	12000
16	81		7	9	3	30-35000	15—18	22-24	8.9	50—55	.125	.33	13000
17	83		2	10	5	19-23000	7—13	11-17	9.0	34	.14	.33	8000
18	85		5	5	5	27-33000	16—20	15-20	8.5	50—60	.14	.31	12000
19	83		4	6	7	28-33000	15—20	20-26	8.5	55—60	.125	.31	10000
20	78		7	15		28-31000	12—18	17-23	9.1	48	.125	.33	12000
24	70		1	2	27	28-31000	22—28	27-30	8.4	50—55	.186	.30	6000
28	99.6–99.9					17-20000	40—50	60-70	8.8	30—40	.25	.32	4000
29	56	0.5	1		41	70000	22—35	25	8.4	104—119	.25	.30	28000
32	8	92				16-20000	1—2	1-2	2.8	50—55	.186	.10	10000
33	3	82			15	20-26000	1—3	1-2	3.1	60—65	.186	.11	12000

TOCH BROTHERS

ESTABLISHED 1848

Inventors and Manufacturers of R. I. W. Preservative Paints, Compounds, Enamels, etc.

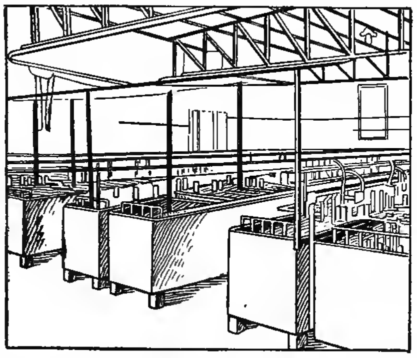
320 Fifth Avenue, New York City

Works: New York; London, England; Toronto, Canada

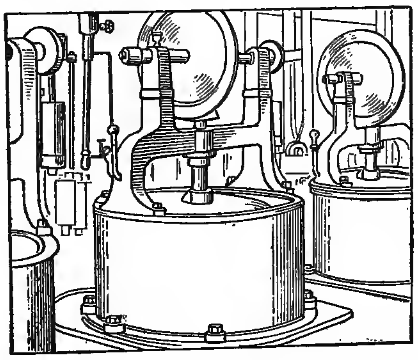
R.I.W.
REMEMBER ITS WATERPROOF
REG. U S PAT OFF

PRODUCTS: Technical and Scientific Paints, Enamels and Compounds; Waterproofing and Dampproofing Compounds; Acid and Alkali Resisting Paints, Enamels and Cements; Steel Preservatives; Cement and Mortar Colors; Cement Floor Coatings; Insulating Paints; Smokestack Paints; Machinery and Factory Enamels; Varnishes; Chemicals.

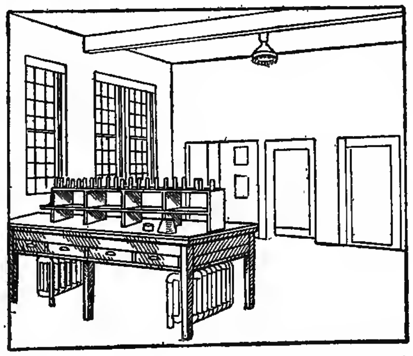
The products described opposite will be particularly interesting to the chemical industries.



Preservatives that Offer Positive Protection to Storage Battery Rooms, etc.



Preservatives for Tanks, Machinery and all Around the Plant



Preservatives for Laboratory Walls, Ceilings and Equipment

No. 44 R. I. W. ACID-PROOF PAINT

A black material, strongly acid-proof and moderately alkali-proof. Extensively used for coating exteriors of wood or metal tanks not exposed to the weather. Withstands heat up to the carbonization point and resists chlorine and other chemicals. Has record of three years and four months on brick walls, ceiling and floor of storage battery room where sulphuric acid vapors condense twice a day. Has withstood sulphuric acid 20 degrees strength for two months, 10% copper sulphate at 135 degrees F. for six months, and caustic soda, 10% strength, etc.

R. I. W. HOSPITAL AND LABORATORY ENAMEL

A high grade white enamel made to be applied in three coats. With all the good points of old time enamel, this Toch product has the added features of staying white and adhering. It successfully resists the action of sulphuretted hydrogen, gases and fumes of acids and chemicals. For laboratories, breweries, milk stations, garages, hospitals, etc., it will be found a very superior white finish.

R. I. W. MACHINERY ENAMEL

This enamel is supplied in any shade desired. It is heat, steam and oil proof and eminently suitable for all kinds of machinery. Very extensively used for finishing electric dynamos and motors and other electric machinery

R. I. W. CEMENT FILLER AND CEMENT FLOOR PAINT (Patented as to Portland Cement, Feb. 27, 1906)

A complete preventive of "cement dusting." The filler is a transparent material which seals the sandy porous surface of the floor. The paint follows as a protective and decorative coating in any one of twelve standard shades. Special shades to order.

Cement floors, old or new, treated with this combination, become at once dustless and resistant to water, oil or grease.

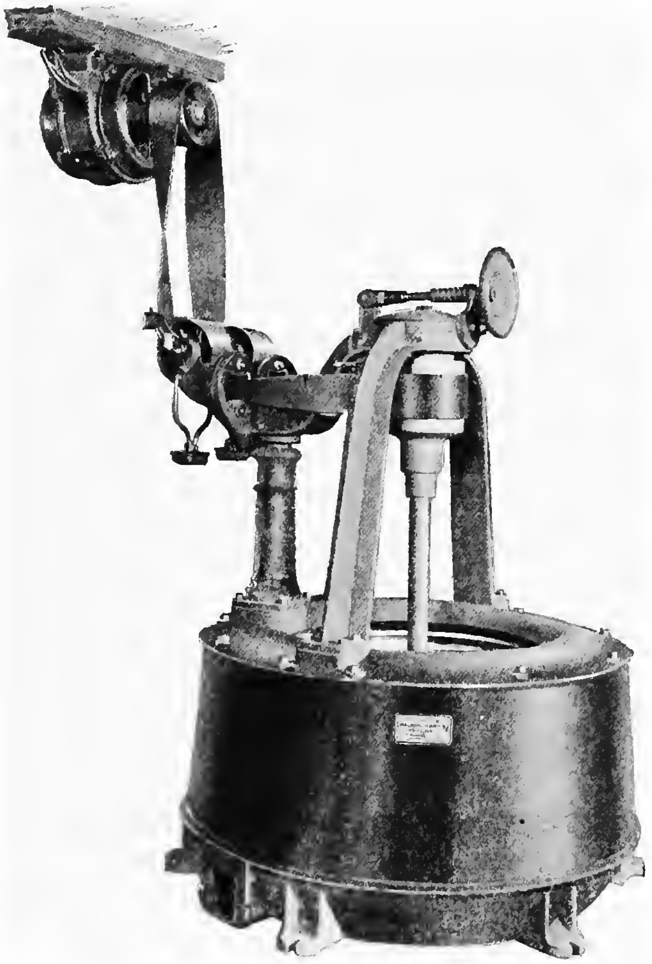
A patented treatment. There can be no other like it.

Copy of the "Red Book" sent free, postpaid.

TOLHURST MACHINE WORKS

TROY, N. Y.

PRODUCTS: Centrifugal Extractors of all types and for all purposes. Basket sizes from 12 to 72 inches.

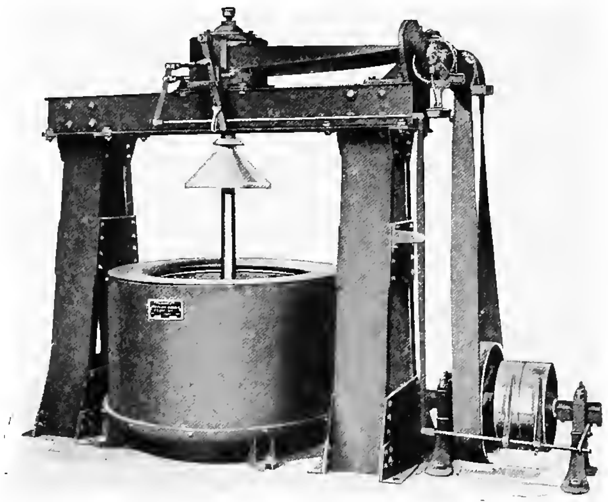


TOLHURST SELF-BALANCING CENTRIFUGAL, MOTOR DRIVEN

TOLHURST CENTRIFUGALS:

The Tolhurst SELF-BALANCING Centrifugal is truly a self-balancing machine; its flexible bearings and oscillating step cup enable it to perform its function without relying on rubbers, springs or swinging cases. This type of machine carrics an unbalanced load with a smoothness and safety achieved in no other Centrifugal.

The Tolhurst SUSPENDED, OPEN TOP and SOLID CURB Centrifugals have been given the same care and attention to details, and for uses where these types are called for, each will be found to embody the latest and best practice in centrifugal machine construction.



TOLHURST SUSPENDED CENTRIFUGAL, COUNTER-SHAFT DRIVEN

BASKETS:

Baskets are constructed of steel, iron, copper and bronze, or in fact of any practicable material made necessary by the uses intended. They are made with bottom discharge or with removable inner baskets, depending on the type of Centrifugal and product to be handled

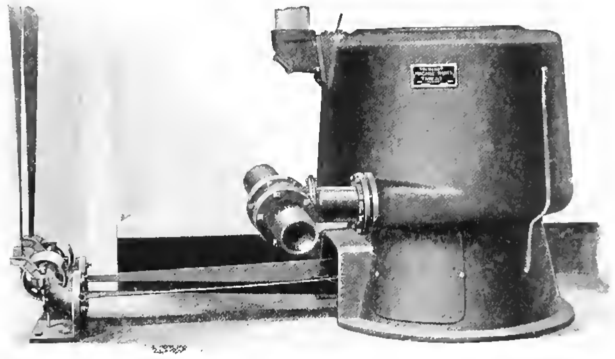
LUBRICATION:

This very important feature has been given careful and painstaking attention, and in each type a system is employed which makes lubrication ample, simple and positive.

Continued on Next Page

DRIVE:

Tolhurst Centrifugals are driven by countershaft, motor or engine, but in every case the power is conveyed from its source to the Centrifugal through the medium of a belt, thus avoiding the employment of gears or universal joints and taking from the motor all vibration; in the case of engine drive, this allows us to use a slow-speed, governor-controlled engine, which in its turn insures long life and freedom from frequent shut downs.



TOLHURST ACID WRINGER

IDLERS:

All Tolhurst Centrifugals are fitted with TOLHURST PATENTED ADJUSTABLE IDLERS, which enable the user to change at will from countershaft to motor or engine drive without changing the Centrifugal other than adjusting the idlers. In the same manner the countershaft or motor may be located on the floor or on the ceiling above the machine.

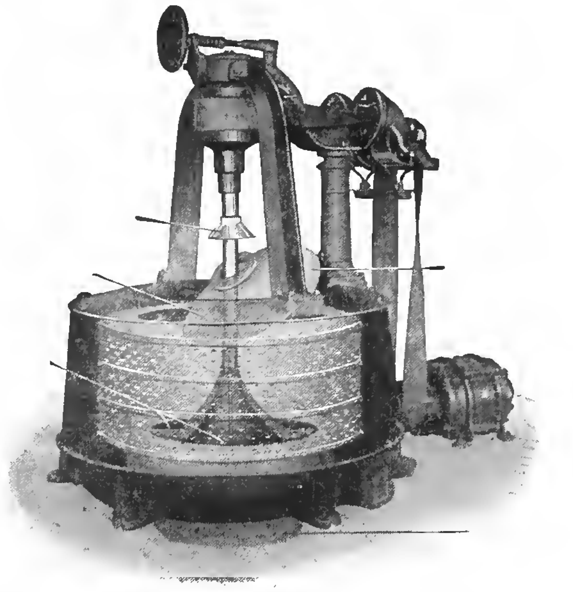
FOR HEAVY CHEMICALS, NITRO-CELLULOSE, CRYSTALS, SLUDGE, ETC.:

Sizes 12″ to 72″ diameter, and all styles, over driven or suspended, with or without annular discharge; under driven, with or without removable baskets. Or built to your special requirements.

It is practically impossible to divide the load evenly on all sides of the basket.

One pound more weight on one side than the other will impose a strain of *hundreds of pounds* on shaft' bearings and basket when revolving at high speed, UNLESS (and here's the Tolhurst advantage) the revolving parts are designed to *automatically* find and retain the common center in relation to the unbalanced load. In that case the strains decrease to an insignificant fraction.

Tolhurst Standard Centrifugals accomplish this by simple mechanical means and without resorting to springs, rubber cushions, oscillating cases or other complicated devices.



ANNULAR BOTTOM DISCHARGE

CENTRIFUGAL PROBLEMS:

This Company, established in 1852, has been designing and building centrifugal machinery since 1875 and during all of that time has specialized in centrifugal problems. The experience and knowledge gained by these years of specializing will be gladly placed at the disposal of parties or firms interested to assist them in applying the principles of centrifugal force in the performance of their work.

THE W. S. TYLER COMPANY

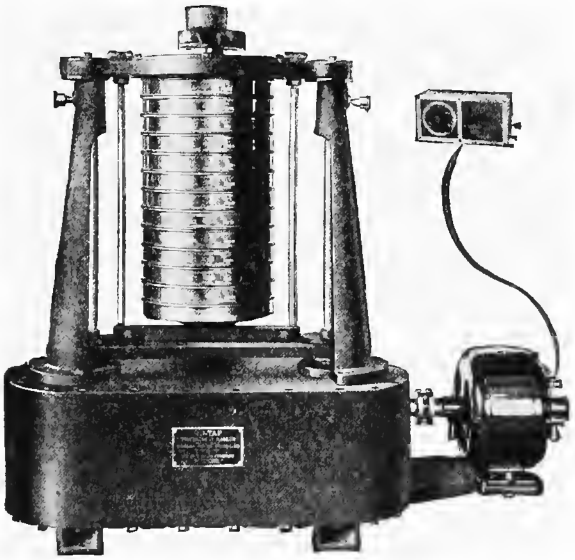
CLEVELAND, OHIO

Manufacturers of the

Tyler "Double Crimped" Wire Cloth and Mining Screen

PRODUCTS: Wire Cloth and Mining Screen from 4″ space to 300 mesh; Screen Scale Sieves and Testing Sieve Shakers.

RO-TAP TESTING SIEVE SHAKER:



Here is a machine that will save its cost in a few months.

The RO-TAP Testing Sieve Shaker reproduces the circular and tapping motion given testing sieves in hand sieving, but with a uniform mechanical action producing dependable sizing tests.

Results with the RO-TAP can be duplicated and standardized.

Seven different samples can be tested with the RO-TAP at one time.

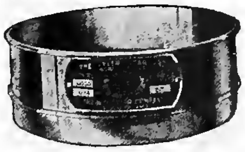
The RO-TAP is 30″ high, 32″ wide, and 17″ in depth, and requires no foundation. It is run by a ⅙ horse power motor, and is furnished ready to run with either direct or alternating current motor. A belt drive can be used in the absence of electric power.

The STOP-RITE Time Switch automatically controls the timing of RO-TAP tests, thus leaving the operator entirely free to weigh samples or do other work while the test is being run.

Write for full particulars and prices.

SCREEN SCALE SIEVES MADE TO A FIXED RATIO:

Half Height 8″ dia. Sieve



Full Height 8″ dia. Sieve

The Tyler Standard Screen Scale Sieves have been constructed from wire cloth, specially prepared, with accurately measured openings that increase and decrease throughout the series in a fixed ratio.

The Screen Scale has as its base an opening of .0029 which is the opening in 200 mesh .0021 wire—the standard sieve as adopted by the Bureau of Standards.

The diameter of the openings as shown in the table increase in the Rittinger ratio of the square root of 2 or 1.414, making the area of each sieve in the scale just double that of the next finer or half that of the next coarser.

The Tyler Standard Screen Scale Sieves divide the tested product in much better proportion than a Sieve series with no relationship between the openings.

Tyler Standard Screen Scale

Ratio √2 or 1.414			
Opening in Inches	Opening in Millimeters	Mesh	Diam. Wire, Dec. of an Inch
1.050	26.67		.149
.742	18.85		.135
.525	13.33		.105
.371	9.423		.092
.263	6.680	3	.070
.185	4.699	4	.065
.131	3.327	6	.036
.093	2.362	8	.032
.065	1.651	10	.035
.046	1.168	14	.025
.0328	.833	20	.0172
.0232	.589	28	.0125
.0164	.417	35	.0122
.0116	.295	48	.0092
.0082	.208	65	.0072
.0058	.147	100	.0042
.0041	.104	150	.0026
.0029	.074	200	.0021

Specially ruled paper is furnished in connection with the Sieves for making either a cumulative direct plot or a cumulative logarithmic plot showing a graphic illustration of screen analysis.

The No. B36 Testing Sieve catalogue describes fully the Screen Scale Sieve and the method of plotting curves and will be sent on request.

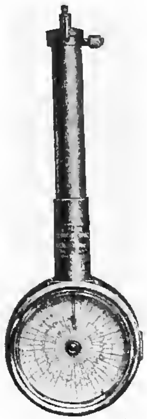
Write for Testing Sieve Catalogue No. B36 and discounts.

UEHLING INSTRUMENT COMPANY

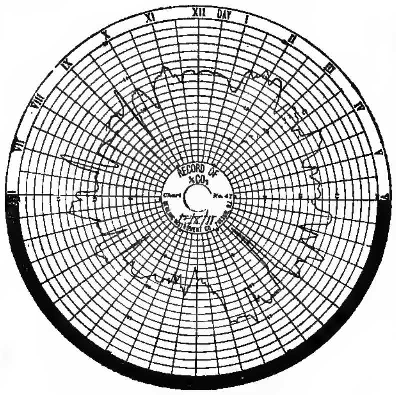
2107 Empire Bldg., NEW YORK CITY

BOSTON CHICAGO DETROIT SAN FRANCISCO

PRODUCTS: Instruments for Measuring and Recording CO_2, Temperature, Draft, Differential Draft, Pressure, Differential Pressure, Absolute Pressure, Barometric Pressure, Speed, Time, etc.



CO_2 Recorder



CO_2 Record. Made on 8 inch Chart

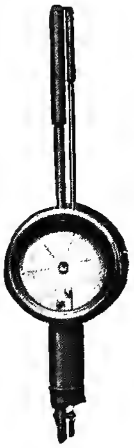
CO_2 Indicator

UEHLING CO_2 RECORDING EQUIPMENT:

This equipment consists of the instrument proper which can be located in any convenient part of the plant, the CO_2 recording gauge which can be located in the office of the chief engineer or superintendent, and the auxiliary CO_2 indicator which can be located at the furnace front for the guidance of the fireman or attendant, who thereby can be held responsible for the record produced.

The subject of combustion efficiency is undoubtedly one of the most important before the engineer, and it is through the above equipment that we are able to provide a means for keeping continuous tabs on the fuel wasted up the chimney.

Uehling CO_2 Recording Equipment eliminates the use of springs, multiplying levers, rubber hose connections, automatic cocks, glassware and corrosive liquids, all of which elements are a source of trouble. Send for our Bulletin 110.

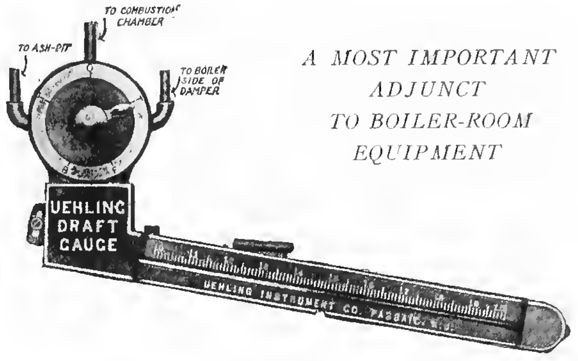


Combined Barometer and Vacuum Recorder

UEHLING COMBINED BAROMETER AND VACUUM RECORDER:

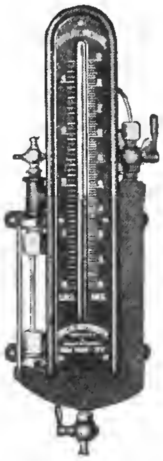
This instrument will put a record of both the vacuum and barometric pressures on the same chart, and is therefore of particular value when applied to condensing plants or the measurement of any other vacuum, where it is of importance to compensate for any change in barometric pressure. In this recorder the difference between the two records always represents the absolute pressure.

UEHLING DRAFT ANALYZER:



A MOST IMPORTANT ADJUNCT TO BOILER-ROOM EQUIPMENT

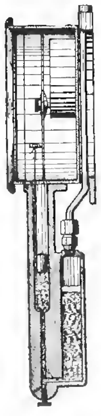
This instrument when connected as shown will measure the resistance through the fire bed, the resistance through the tubes and the combined resistance through the fire and the tubes. It therefore provides an exceptional means for studying draft conditions, and building up the percentage of CO_2 in the products of combustion.



Absolute Pressure Indicator

UEHLING ABSOLUTE PRESSURE INDICATOR:

This instrument will measure absolute pressure in pounds per square inch and inches of mercury head and is entirely independent of any change in barometric pressure. It is therefore most reliable and accurate in vacuum determinations.



Pressure Recorder

UEHLING RECORDING INSTRUMENTS:

All Uehling Recording Instruments are based on the hydrostatic principle as indicated by the sectional cut. It is this principle which in itself guarantees absolute accuracy and makes it possible to eliminate the use of springs, levers and joint movements which are invariably a source of change in calibration due to variable friction and molecular construction of the material used.

UNION STEAM PUMP COMPANY

MANUFACTURERS OF

Burnham & Moore Steam Pumps, Union Centrifugal Pumps, Power Pumps, Air Compressors and Condensers

BATTLE CREEK, MICH.

PRODUCTS: Air Compressors; Jet and Surface Condensers; Pumps: Steam, Power, Air and Circulating, Boiler Feed, Deep Well, Oil, Vacuum, Steam-Heating Vacuum, Sugar House, Acids, Tank, Light Pressure, Creamery, Ammonia, Brewery, Hydraulic Pressure, Centrifugal.

UNION AIR COMPRESSORS:

The Union line of air compressors is very extensive, so complete that it embraces machines adapted for all possible requirements. Air compressors are provided with the Union noiseless flat disk valves, made of special heat-treated vanadium steel (see illustration).

Union air compressors are manufactured to suit surrounding conditions, and in various styles and capacities required for the due performance of light or onerous duty. The most important types of air compressors are:

Horizontal Type—(1) Single or duplex, crank and fly wheel, high speed, enclosed type; steam-, belt- or motor-driven; with capacities ranging from 50 to 2,000 cubic feet of air per minute.

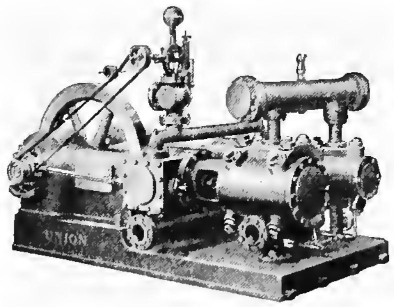
(2) Moderate speed type, any drive, with capacities from 50 to 2,000 cubic feet of air per minute.

Vertical Type—(1) Single, high-speed, air-cooled, garage compressors, belt- or motor-driven, with capacities from 2½ to 16 cubic feet of air per minute.

(2) Single, high-speed, water-cooled, belt- or motor-driven, with capacities from 8 to 40 cubic feet of air per minute.

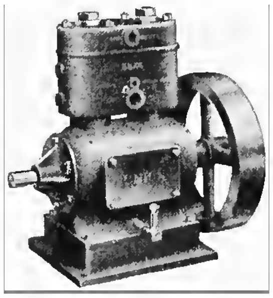
(3) Duplex, high speed, water-cooled, belt- or motor-driven, with capacities varying from 25 to 140 cubic feet per minute.

Construction and Material—All these air compressors are of rigid construction, with solid bases, reducing vibration to a minimum. The best of material only is used throughout. Further particulars sent upon application.



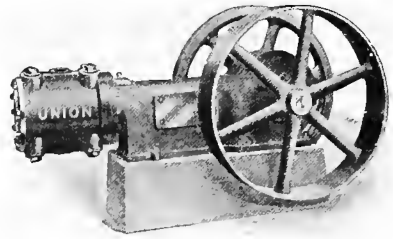
DUPLEX AIR COMPRESSOR

Built in belt- and steam-driven types; single-stage or two-stage. Capacities, single-stage, up to 1800 cu. ft.; two-stage, up to 1100 cu. ft. per minute



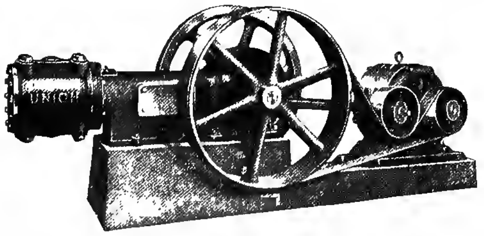
Union Duplex Vertical Belt-Driven Air Compressor

Water-cooled. Capacities, 25 to 140 cu. ft. per minute



Horizontal High Speed Belt-Driven Air Compressor

Capacities, 57 to 1146 cu. ft. per minute.

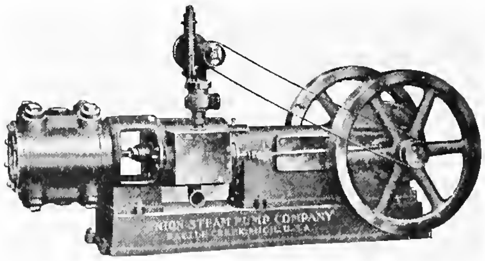


Horizontal High Speed Short-Belt Driven Air Compressor

Capacities, 57 to 1146 cu. ft. per minute

The Flat Disk Valve

Made of special vanadium steel. Used in all compressors



Horizontal High Speed Steam-Driven Air Compressor

Capacities, 57 to 1146 cu. ft. per minute

Continued on Next Page

STEAM PUMPS:

This Company manufactures the great "Burnham" direct-acting simplex steam pump. The Burnham has fewer parts and is more economical in operation than any other steam pump on the market. Burnham pumps positively will not short-stroke. The Moore steam pump is also made by this Company and can be furnished for capacities from 3 to 20 gallons per minute.

UNION POWER PUMPS:

Built for every service. Substantially constructed and designed along latest engineering lines.

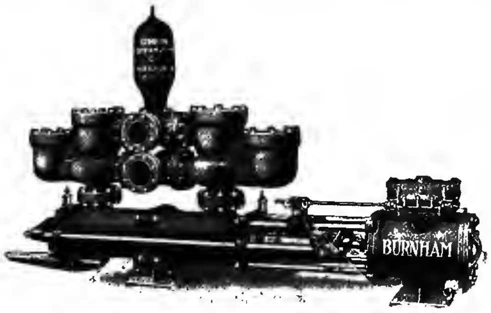
UNION CENTRIFUGAL PUMPS:

Manufactured in several styles to meet all requirements; belt- and motor-driven types. Write for full information.

NOTE.—We change the construction of our pumps to handle various chemical solutions, and we furnish special valves for handling thick or heavy liquids.

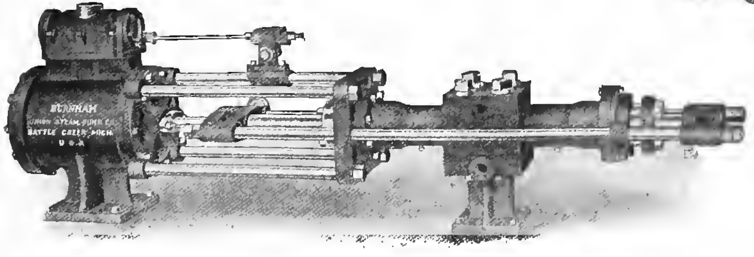
CO-OPERATIVE SERVICE:

Upon receipt of full particulars of conditions and requirements of service, with specifications, the recommendations and proposals of the engineering department of this Company, covering the proper equipment in each case, will be forwarded to intending purchasers, free of charge. Bulletins giving capacities, pressures, etc., on pumps and air compressors for every service, also dimension prints, etc., will be furnished on request.



BURNHAM POT-VALVE PLUNGER PUMP

For high pressures up to 2,000 pounds

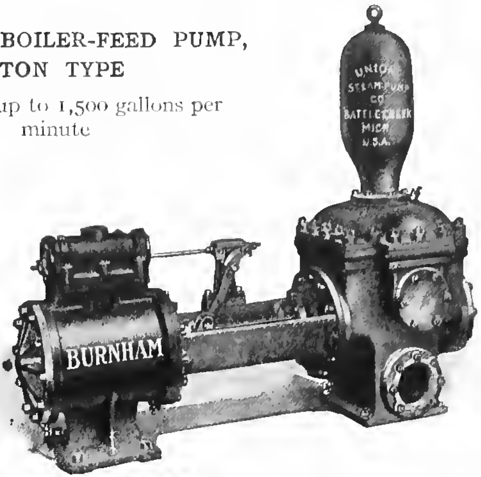


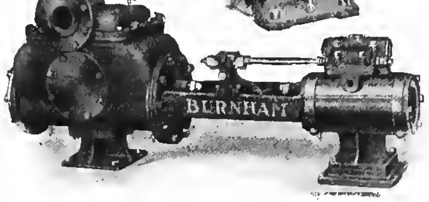
BURNHAM HYDRAULIC PRESSURE PUMP

With Forged-Steel Water Cylinder, designed for an allowable working pressure of 5,000 pounds per square inch

BURNHAM BOILER-FEED PUMP, PISTON TYPE

Capacities up to 1,500 gallons per minute



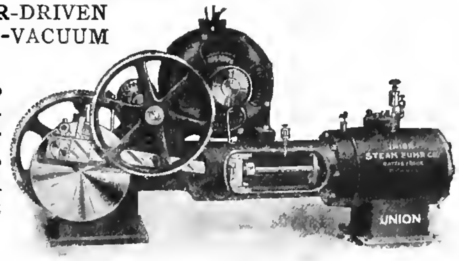


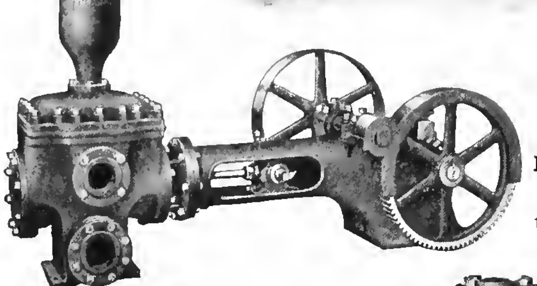
BURNHAM BRONZE-CYLINDER GENERAL-SERVICE PUMP

Capacities up to 800 gallons per minute

UNION MOTOR-DRIVEN ROTATIVE DRY-VACUUM PUMP

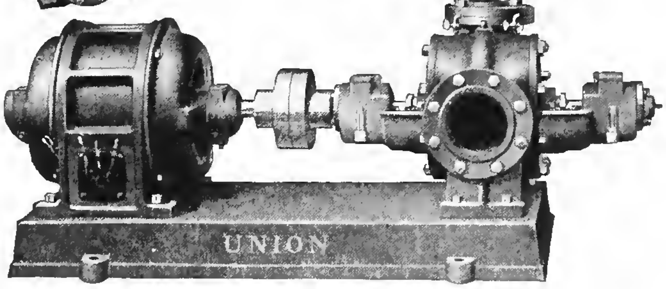
Capacities up to 3,000 cu. ft. displacement per minute. Made also to run by steam or belt





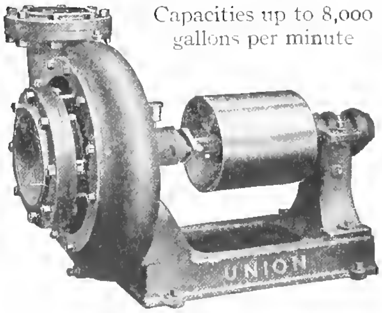
UNION BELT-DRIVEN BOILER-FEED PUMP

Capacities up to 500 gallons per minute



UNION DOUBLE-SUCTION, MOTOR-DRIVEN CENTRIFUGAL PUMP, CLASS "L"

Capacities up to 8,000 gallons per minute



UNION CLASS "E" CENTRIFUGAL PUMP, BELT-DRIVEN

Capacities up to 1,200 per minute

UNITED LEAD COMPANY

Manufacturers of "United" Process Lined Products
Chemical Sheet Lead and Chemical Lead Pipe

111 Broadway, NEW YORK, N. Y.

PRODUCTS:

Lead or Tin Lined

Iron Pipe,	**Valves,**
Brass Pipe,	**Fittings,**
Copper Pipe,	**Tanks,**
Steel Pipe,	**Apparatus.**

Brass Lined Iron Pipe.
Copper Lined Iron Pipe.

Lead or Tin Covered Pipe and Fittings.

Chemical Sheet Lead and Chemical Lead Pipe.

"UNITED" LINED PIPE:

"United" pipe, as its name implies, is a tube of either lead, pure block tin, brass or copper, thoroughly and inseparably united throughout its entire length to an outer tube of wrought iron, steel or other metal.

The lining is a seamless tube with a perfectly smooth interior surface and of substantial thickness, and so perfectly united to the outer pipe that it is impossible to separate without melting.

The advantage of "United" seamless tube lining is very evident as compared with a cast or poured lining.

"UNITED" FLANGED LEAD-LINED PIPE AND FITTINGS:

Flanged Lead-Lined Pipe is particularly adapted for handling acids or any liquid which has a corrosive action on iron pipe. A lead contact for the acid is obtained by the lead lining, while the outer iron pipe protects the lead both from pressure and abrasion or sagging and collapse. The lining is turned over the face of the recessed flange making it possible to obtain an absolutely tight lead-to-lead joint, which, of course, is essential where an acid of a searching or corrosive nature is handled.

FLANGED LEAD-LINED ELBOW

Fittings are furnished either standard weight or extra heavy. Regular standard flanges faced and drilled according to the A. S. M. E. standard unless otherwise specified.

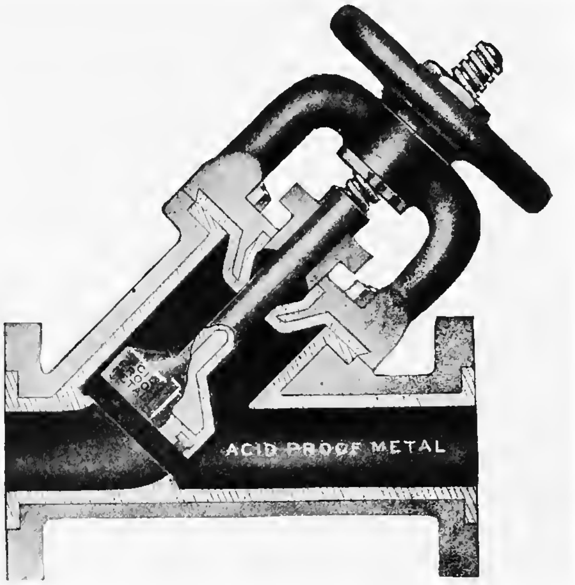
Standard fittings of all sizes and styles, flanged or screw connections, in stock. Special fittings of all styles manufactured and lined.

"UNITED" ACID PROOF VALVES:

Our Special Acid Resisting Valves are strongly recommended for use in connection with our "United" Lead Lined Pipe or with plain lead pipe. The flanges are extra strong and are not so liable to be broken or cracked as the flanges on solid lead or composition valves. The lining is a special alloy with extra hard seat to resist wear and withstand the action of corrosive acids such as sulphuric, etc.

We are in a position to furnish Acid Valves in any standard pattern and size, such as "Y" Pattern (see illustration below), Gate, Angle, Globe, Check or special valves of all types.

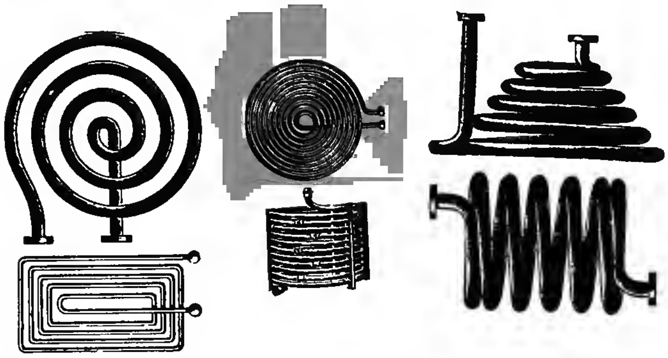
These Valves are fully guaranteed.



"Y" PATTERN ACID VALVE

This represents our special "Y" pattern Acid Valve, heavily lined throughout with special acid-resisting alloy, and which we can confidently recommend as a very superior article where a full-way valve is desired. Note the clean, unobstructed passage, giving maximum capacity with minimum amount of friction. It is of simple and durable design, very strongly constructed, and has been used with great success in acid and chemical plants, pulp and paper mills, etc., and is adapted for use in any place where a perfectly acid-proof valve is required.

HEATING AND COOLING COILS LINED OR COVERED HOMOGENEOUSLY WITH LEAD OR TIN:



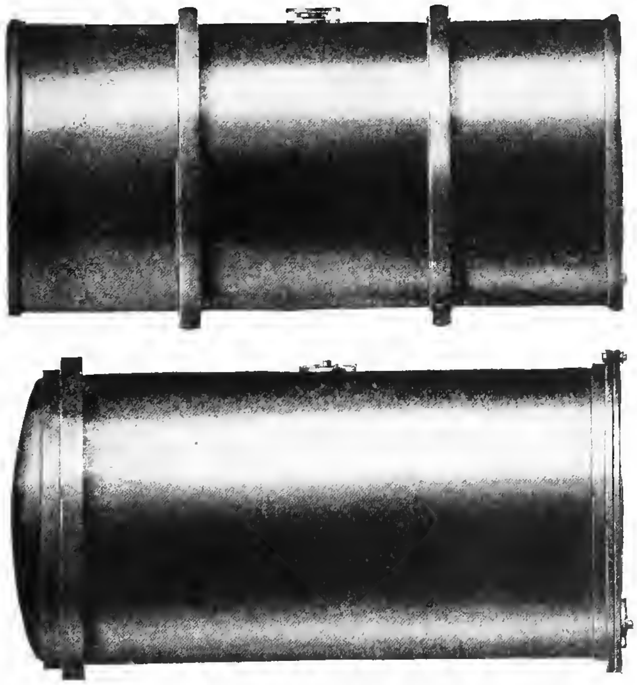
HARD LEAD PLUG COCKS:

These Hard Lead Plug Cocks and Bibbs are adapted for contact with acid where they are opened or used **infrequently**; where the stress caused by operation is sufficiently severe, we strongly recommend in all such cases the installation of our Acid-Proof Valves.

Supplied in all sizes and styles.

HARD LEAD FLANGED PLUG COCK

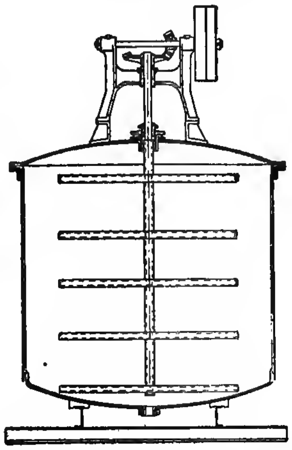
HOMOGENEOUSLY LEAD LINED ACID PROOF TRANSPORTING DRUMS:



These drums can be furnished in all sizes and styles.

SPECIAL HOMOGENEOUSLY LEAD AND TIN LINED APPARATUS:

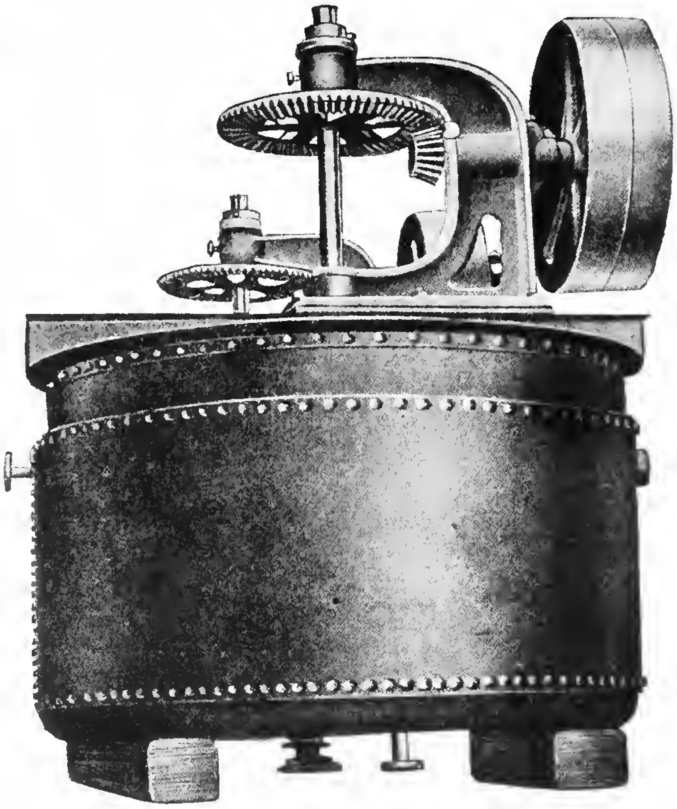
Autoclaves; Drums; Extractors; Kettles, Plain, Steam Jacketed, both with and without Stirrers; Stills; Vacuum Evaporators; etc.



Sectional View Mixing Kettle

Our apparatus and pipes can be made .or the highest vacuum or pressure.

We are prepared to quote on such special apparatus to be made from engineers' designs. Specifications for such goods should be explicit and complete, and whenever possible accompanied by blue-print or sketch.



Steam Jacketed Mixing Kettle

Our aim has been to produce the best material obtainable in this line, and from the enthusiastic indorsements received from users of our goods, we feel that we have been amply repaid in being able to offer and place upon the market a perfect article of superior merit, which, we believe will be appreciated by the trade.

We absolutely guarantee all of our products.

CATALOGS:

Complete Catalog of "United" Lined Products mailed on request.

UNITED STATES CAST IRON PIPE & FOUNDRY CO.

General Offices:

BURLINGTON, NEW JERSEY.

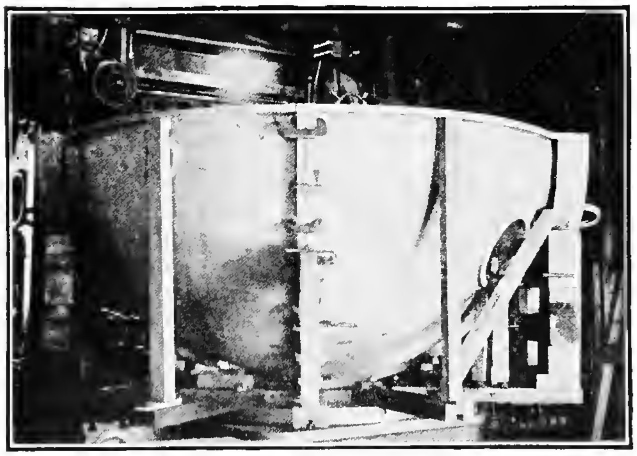
Sales Offices

Philadelphia, Pa., 3005 Morris Building
New York, N. Y., 2239 Empire Building
Pittsburgh, Pa., 2811 Henry W. Oliver Building
Chicago, Ill., 1977 Peoples Gas Building
Birmingham, Ala., 1856 Amer. Trust Building
St. Louis, Mo., 1826 Security Building
Kansas City, Mo., 1817 R. A. Long Building
San Francisco, Cal., 1569 Monadnock Building
Portland, Ore., 1694 Northwestern Bank Building

Works

Addyston, Ohio
Anniston, Ala.
Bessemer, Ala.
Birmingham, Ala.
Buffalo, N. Y.
Burlington, N. J.
Chattanooga, Tenn.
Cleveland, Ohio
Columbus, Ohio
Louisville, Ky.
Scottdale, Pa.
Superior, Wis.

PRODUCTS: Chemical Castings such as Cast Iron Niter Pots, Trays, Preheaters, Converters, Retorts, Pans, Carbonating Tanks, Kettles, Vats, Tanks, Naphthalene Scrubbers, Benzol Agitators, Stills, Vacuum Evaporators, Digestors, Acid Eggs, and many other Chemical Castings; Chemical Apparatus; also Cast Iron Bell and Spigot and Flanged Pipe and Fittings for Water and Gas; Flexible Joints for Submerged Lines; High-Pressure Pipe and Specials for Fire Service; Plain End and Threaded Cast Iron Pipe; Cast Iron Culverts, Drains, Sewers; Smoke Flues; Keystone Columns, etc.; and Large Special Castings made to purchaser's designs.



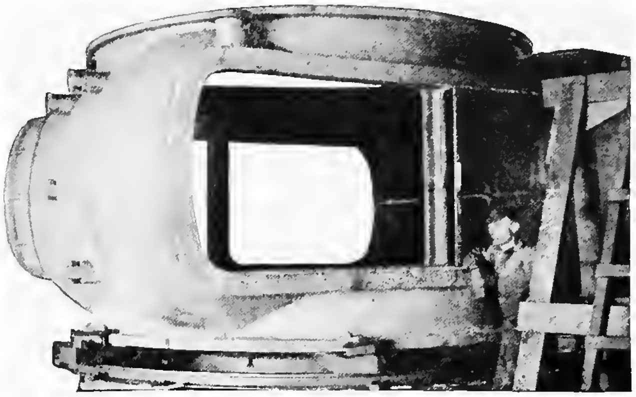
CAST IRON STILL

CHEMICAL CASTINGS:

We make a specialty of building chemical castings to your designs and our foundries are equipped to make these castings in any size from the largest to the smallest.

CAST IRON PIPE:

For carrying chemicals, such as acids, as well as water, Cast Iron Pipe has proven very satisfactory and is now extensively used.



CAST IRON TUBE NOZZLE RING

HEAVY LOAM CASTINGS:

Heavy loam castings built to designs of engineers. Our special foundry facilities may be employed to particular advantage in the building of machinery requiring heavy castings, and engineers are invited to submit designs for estimates.

FACILITIES AND SHIPMENTS:

Prompt shipments are assured by the large productive capacity and ample stocks of our several plants, which are favorably located in different sections of the country. When desirable, large orders can be divided among two or more works to facilitate deliveries.

CATALOGUES, ETC.:

For catalogues, specifications, or special literature or information, apply to Publicity Department, Burlington, New Jersey, and mention this publication.

WERNER & PFLEIDERER CO., Inc.

GENERAL OFFICES AND FACTORY: SAGINAW, MICHIGAN
BRANCHES IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD
Patentees and Builders of

Machinery and Appliances, used in the Chemical, Pharmaceutical, and Allied Industries

PRODUCTS: Kneading and Mixing Machines of all kinds and descriptions, including Automatic Weighing Machinery; Baking Ovens; Blenders; Brakes; Compounders; Conveyors; Drying Ovens; Enamel Baking and Drying Ovens; Elevators; Filter Presses; Flour Handling Machinery; Hydraulic Presses; Kneader; Masticators; Nitrating Machines; Paper Pulpers; Rapid Dissolvers for China Clay, Kaolin, Chloride of Lime, etc.; Rubber Washers; Screw Presses; Sifters; Solvent Recovery Apparatuses; Vacuum Machines; Complete installations for the manufacture of Bread, Macaroni, Noodles, etc.

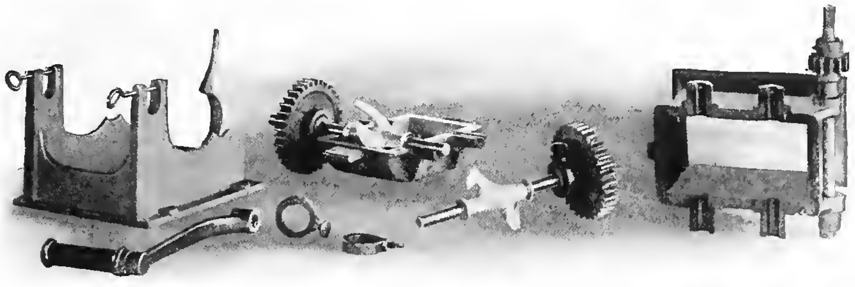


Fig. 100

SIZE 4, TYPE I/II TAKEN APART FOR CLEANING.

WE CLASSIFY OUR MACHINES

in sizes, types and classes.

SIZES

Size	3	4	6	8	11	12	14
Capacity, gals.	¼	⅔	2¼	4½	9	20	50
Capacity, lbs.	2	½	18	38	75	170	420

Size	15	16	17	18	21	30
Capacity, gals.	100	150	200	290	580	2650
Capacity, lbs.	840	1260	1680	2420	5100	22000

NOTICE:

The above figures give the volume of water the machines hold when filled about 3 inches above the blades, the gallon being figured at 8½ lbs. The capacity of the machine, and the quantity of any mass or material which at each operation can be treated, depends on the specific gravity of the respective materials, and also largely on other physical properties. For instance, the size 14 treats only 250 lbs. of stiff macaroni dough, but it mixes equally as well 700 lbs. of putty in one operation.

We wish to draw your attention to the fact that the capacity of our machines (to the top of the trough) is from thirty to fifty per cent greater than that given above.

TYPES

Type I—Made in sizes 3, 4 and 6.
Type II—Made in sizes 6, 8 and 11.
Type III—Made in sizes 11 and 12.
Type IV—Made in sizes 12 and 14.
Type V—Made in sizes 12 and 14.
Type VI—Made in sizes 14, 15 and 16.
Type VII—Made in sizes 14, 15, 16, 17 and 18.
Type VIII—Made in sizes 15, 16, 17 and 18.
Type IX—Made in sizes 14, 15 and 16.
Type X—Made in sizes 15, 16, 17, 18, 21 and 30.

CLASSES:

Class BS (gears on *one* side) are strong machines for kneading and mixing materials of every description of the consistency of ordinary bread doughs, rubber cements, crucible paste, ointments, oils and powders of every description.

Class BB (gears on *both* sides of trough) are adapted for the kneading and mixing of materials such as stiff macaroni dough, pill masses, red and white lead, stiff putty, smokeless gunpowder, etc.

Class C are the very strongest and heaviest built machines and are employed for very tough masses and where occasionally extraordinary sudden jerks and resistance are encountered, as with gutta-percha, india rubber, linoleum, celulloid, etc.

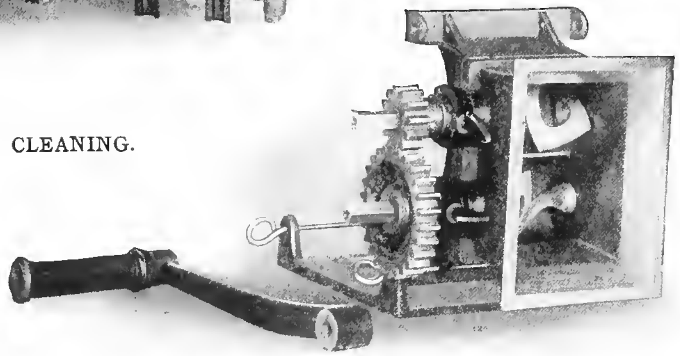


Fig. 103

SIZE 3, TYPE I/II, TILTED POSITION

We have succeeded in solving the most difficult problems of mixing and kneading, and have been successful with materials and manufacturing processes upon which all previous attempts to employ machinery have failed. Therefore, if you have anything to mix, knead, incorporate, malaxate or masticate, and have not the proper machine as yet to do your work effectively, write us and answer the following questions:—

1. What are the materials to be treated and what is their nature?
2. What is the specific gravity of the materials?
3. How many pounds, gallons or cubic feet do you desire to be treated in one operation?
4. In what time should each operation be finished?
5. What quantity is to be treated during ten working hours?
6. What power is available?

By answering the above questions you will enable us to quote you intelligently on the machine suitable for your purposes.

Continued on Next Page

Of course it is quite impossible for us to enumerate all the manufacturers where our "Universal" can be used. There is hardly an industry to which it has not been adapted in one or other of its many varieties. There are now over 30,000 of our "Universal" Kneading & Mixing Machines at work in all parts of the world. This fact in itself will convey an idea of the *large and varied experience we have acquired* in the design of our Kneading and Mixing Machines for special purposes.

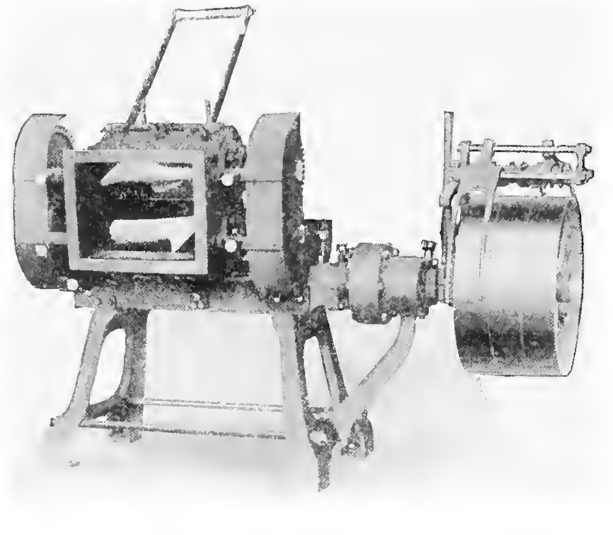


Fig. 203

SIZE 11, TYPE II, CLASS C, CURVED TROUGH; TILTED POSITION

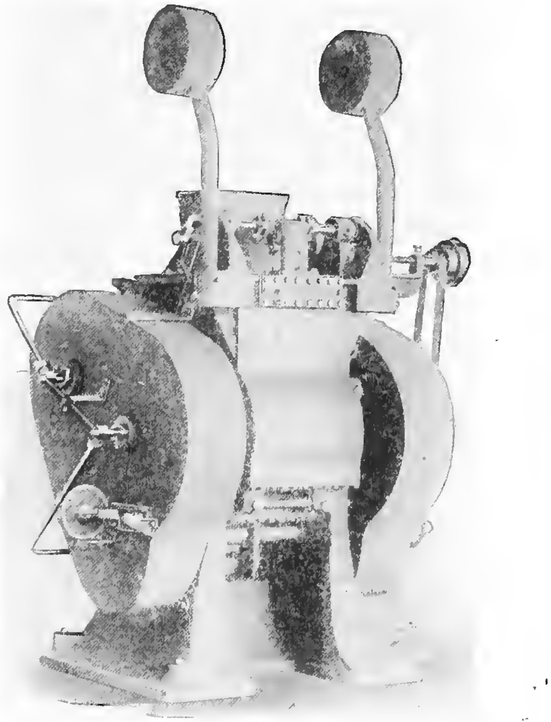


Fig. 401

SIZE 14, TYPE IV, CLASS CC, MOTOR DRIVE, HEATABLE COVER, SIFTER AND AUTOMATIC TIME SIGNAL

The reason why the Werner-Pfleiderer "Universal" Kneading and Mixing Machine cannot be surpassed is due to the fact that it is *the only apparatus which combines in itself a perfect mixer with a thoroughly efficient kneader*. It is entirely distinct from all others and the striking success it has attained in all parts of the globe proves that it is an apparatus of unsurpassed qualities and first-class construction. These qualities are the result of the following special features:

1. The peculiar Kneading Blades (Mixing and Kneading Arms), which possess different forms *according to requirements*, and which revolve in two hollow semi-cylinders, intersecting in each revolution successively every point on the surface of the surrounding cylinder, so that no particle of material can escape getting into the action of the blades.

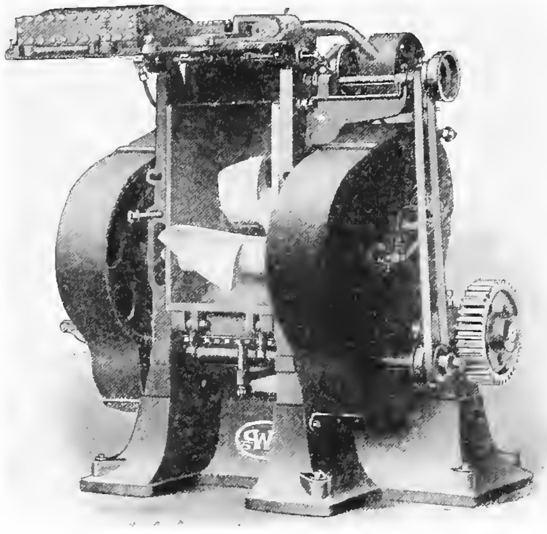


Fig. 402

SIZE 14, TYPE IV, CLASS CC, MOTOR DRIVE, HEATABLE COVER, SIFTER AND AUTOMATIC TIME SIGNAL, WITH FLAP DOOR OPEN

2. The Troughs of the machines which are shaped *according to the requirements* of the materials to be treated, and which are mounted so low that all materials can be charged and discharged conveniently. Our Kneading and Mixing Machines are of a very solid construction and are usually built in iron and steel. For materials, however, which should not be brought in contact with iron or where the machines

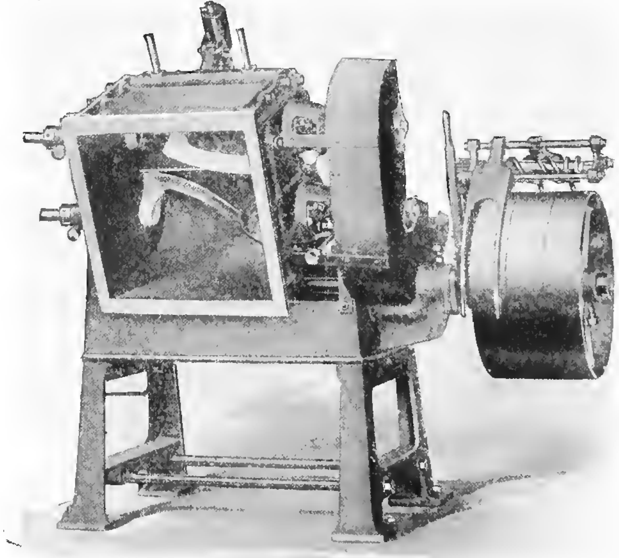


Fig. 505

SIZE 12, TYPE V, CLASS BS, CAST IRON TROUGH, JACKETED, TILTED POSITION

Continued on Next Page

must be protected from the effect of fluids, etc., the trough and blades of the machines can be galvanized, made of bronze or any other suitable material, and where iron must not work against iron we make the blades in brass. In cases where the materials to be treated exercise a severe wearing effect upon the trough and blades, we fit the trough with a removable lining and supply specially protected blades.

The blades may be constructed hollow and the trough jacketed to permit heating by steam or cooling by cold water. Such arrangements are applied where the materials (gutta-percha, chewing gum, chocolate, licorice, etc.) require heating to facilitate the process of mixing and masticating, or where cooling of the material is considered necessary or desirable.

Regarding the speed of the blades, we are also able to suit the numerous requirements of various trades. We construct machines with slow as well as fast speed and also with an arrangement for two speeds.

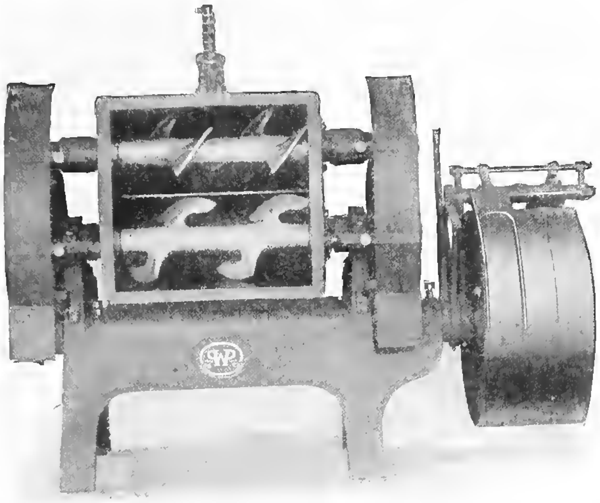


Fig. 509
SIZE 15, TYPE V, CLASS BB, TILTED POSITION

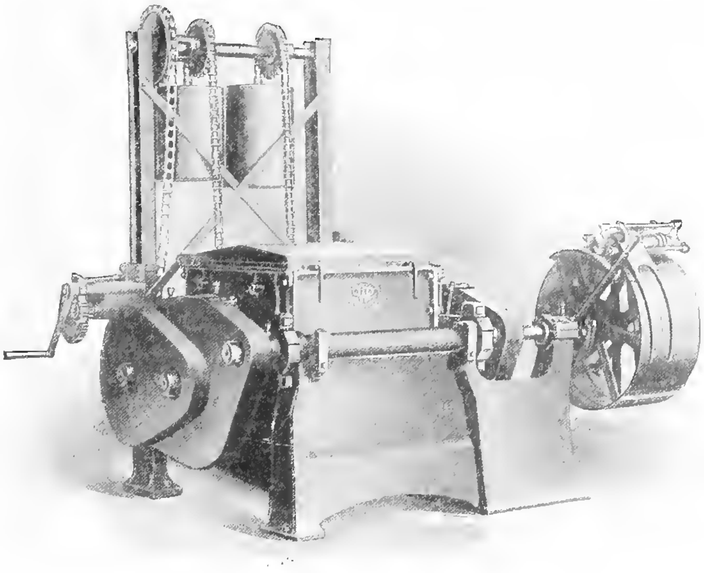


Fig. 701
SIZE 14, TYPE VII, CLASS BB, WORKING POSITION, CAST-IRON TROUGH, SERRATED SHOES, SERRATED SADDLE, VAULTED COUNTERBALANCED COVER

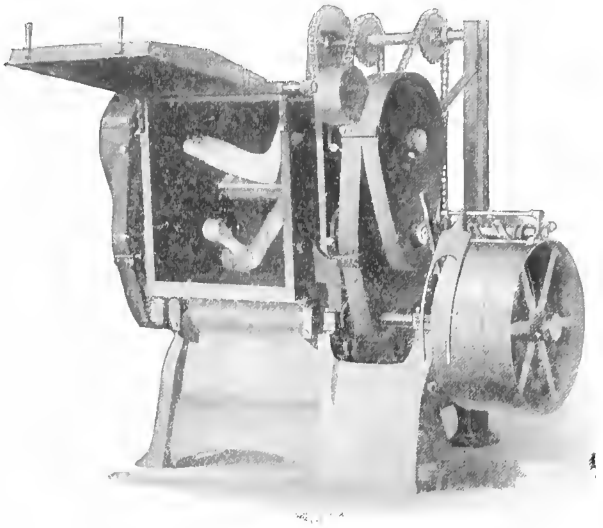


Fig. 702
SIZE 14, TYPE VII, CLASS BB, CAST IRON TROUGH, SERRATED SHOES, SERRATED SADDLE, VAULTED, COUNTERBALANCED COVER, TILTED POSITION

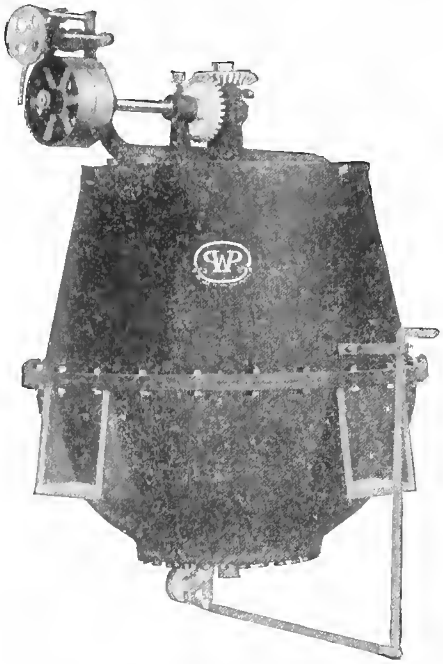


Fig. D-1502
SIZE 1, TYPE DISSOLVER, JACKETED TROUGH, LOWER HALF, WORKING POSITION

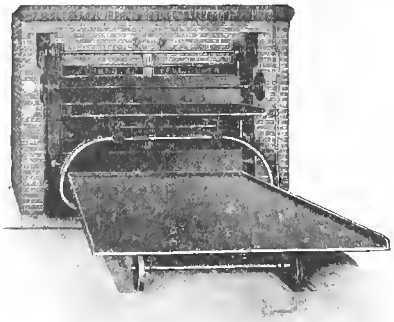


Fig. 198
BAKING AND DRYING DOUBLE-DECK DRAW PLATE OVEN, SHOWING BAKING PLATE DRAWN OUT

Continued on Next Page

RUBBER WASHER:

The old way of washing rubber was to pass the rubber between adjustable rollers that forced it out into a thin sheet, and then, by means of a flow of water, washed away the impurities. This plan has some drawbacks, the most important of which is that the action on the rubber must be rather severe inasmuch as all the power employed is concentrated upon the thin strip then in process of passing through the rollers. Also the amount of rubber turned out by the rollers is limited as only the very narrow strip then passing between the rollers is being treated while the remainder must wait its turn to pass through.

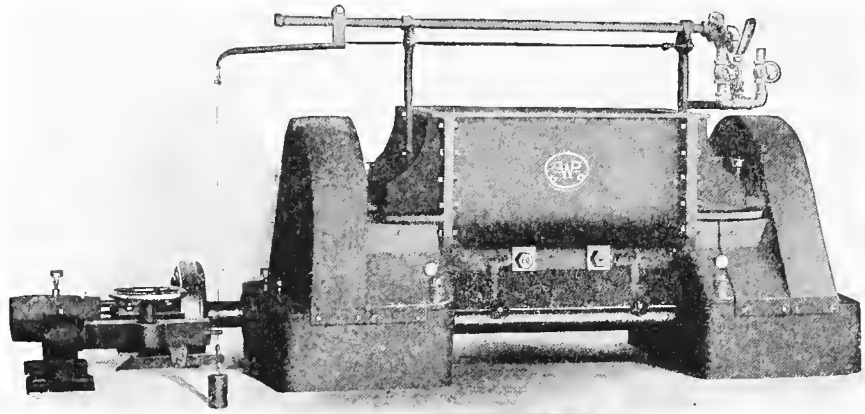


Fig. RW-1504

SIZE 14, SPECIAL CONSTRUCTION, RUBBER WASHER, LEFT HAND DRIVE, WORKING POSITION

The rollers having to be kept very closely adjusted, such impurities as are contained in the rubber must of necessity be crushed and splintered, causing the washing process to be of longer duration than would otherwise be necessary, and in many cases rendering their removal a matter of extreme difficulty, if not an impossibility.

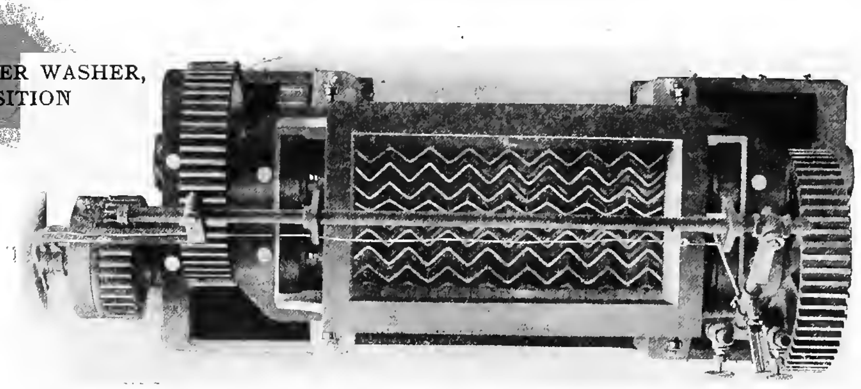


Fig. RW-1505

SIZE 14, SPECIAL CONSTRUCTION RUBBER WASHER, GEAR DRIVE RIGHT-HAND, LOOKING DOWN INTO MACHINE SHOWING ROLLERS

Furthermore, the action of the rollers being rather severe, the rolling process must necessarily have a tendency to impair or damage the rubber. It would, therefore, seem of great importance to avoid deterioration by employing a process of washing which will not be injurious to the rubber or gums.

Our Universal Rubber Washer meets the requirements set out above. Our aim was to design a machine which would bring every particle of rubber into contact with water and allow the water to subsequently escape, carrying all impurities away with it. At the conclusion of extensive and necessarily elaborate experiments, we finally evolved the Universal Rubber Washer.

Our Rubber Washer consists of a peculiarly formed trough in which two corrugated rollers revolve, carrying the rubber down, around and up again, continuously and automatically. The rollers are never brought close together but are held at a fixed distance apart which feature ensures a gentle action on the rubber. By having this certain distance between the rollers, the pressure is always taken up by a cushion of rubber, and as the rubber in the bottom of the trough is being treated simultaneously it is obvious that the power consumed by the machine is always bound to be spread over the greater part of the charge instead of being concentrated on a narrow and very thin strip as is the case with the old roller mills.

Furthermore, by having this distance between the rollers, such impurities as new wood and bark are not splintered, nor are pebbles broken, nor large particles of sand ground, as there is no crushing action.

Sand and other particles that are heavier than water pass out through the slots underneath the rollers and are conveyed through the sand box to the straining vessel, out of which they can easily be shovelled at intervals. Pebbles, nails, etc., that are too large to pass the shakers in the slots under the rollers are caught on the ledges that are on a level with the top of the rollers.

Light impurities, including new wood and bark, are floated off by closing the sand box and the valves in the surrounding jacket, thus raising the level of the water either to a point level with the top of the rollers, or slightly above the top edge of the inner trough.

By the action of the rollers working in conjunction with the peculiar formation of the trough, these impurities are quickly freed and floated off instantaneously on coming to the surface. The flow of water carries the impurities into the surrounding jacket and out through the upper outlets, or through the lower outlets by opening the valves, and thus into the straining vessel.

The machine is entirely automatic in its action so that labor is reduced to a minimum and a uniformly well-washed product is obtained.

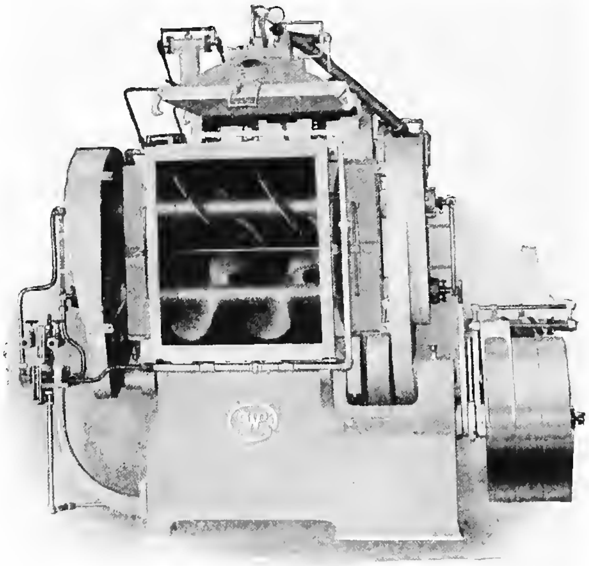


Fig. V-1501

SIZE 15, TYPE VII, CLASS C, SPECIAL CONSTRUCTION VACUUM WITH HEATABLE BLADES, TILTED POSITION

Continued on Next Page

SOME OF THE MATERIALS IN THE MANUFACTURE OF WHICH OUR "UNIVERSAL" KNEADING AND MIXING MACHINES CAN BE USED.

Alkaloids
Artificial Silk
Asbestos
Battery Masses, Dry
Battery Masses, Storage
Butter
Blanc Fixe
Candy
Carbide
Carbon
Carbons, Electric
Carborundum
Celluloid
Cellulose
Chemicals of all kinds
Chewing Gum
Chicles
Chocolates
Clay
China Clay
Cocoa
Cold Creams
Colors
Cork Compounds
Crucibles
Chloride of Lime

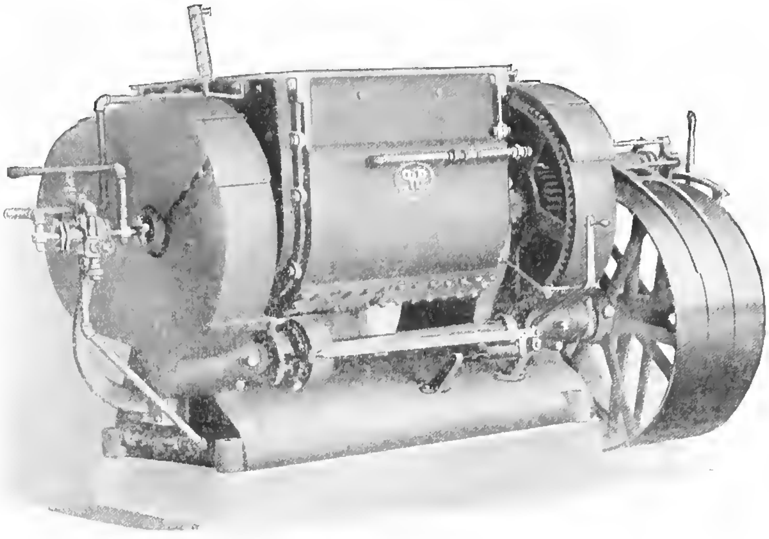


Fig. 900
SIZE 16, TYPE IX/VI, CLASS BB, JACKETED TROUGH, HEATABLE BLADES, WORKING POSITION

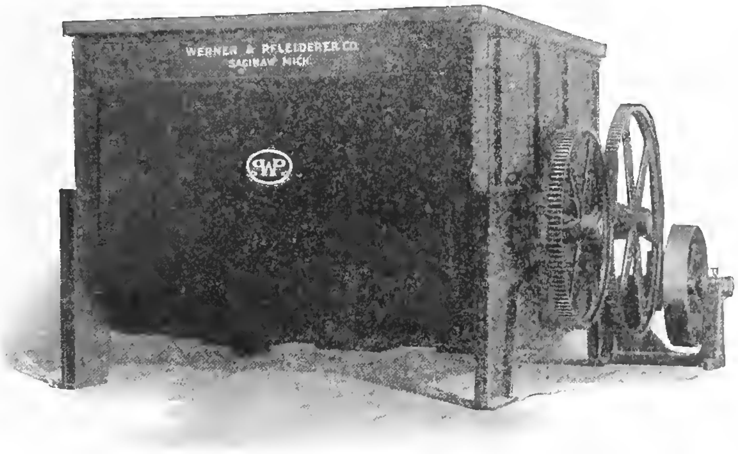


Fig. 1002
SIZE 30, TYPE X, CLASS B, JACKETED TROUGH

Dyes
Dynamite
Emery Masses
Explosives
Fertilizers
Fibre Board
Films, Photographic
Foundry Sand and Loam
Golf Balls
Graphite
Gutta Percha
Insulating Materials
Kaolin
Klingerit
Laboratory work of all kinds
Lanoline
Lead, White
Lead, Red
Licorice
Lincrusta
Linoleum
Lithophone
Lubricating Material
Molasses
Nitrates
Nitro-Cellulose
Ointments
Oleomargerine
Paints
Paper
Pencil Masses
Pharmaceutical Goods
Pill Masses
Powders
Powder, Smokeless
Putties
Rubber, Artificial
Rubber Cements
Rubber, Compounding
Rubber Masticating
Rubber Washing
Soap
Tablet Masses
Tooth Paste
Varnishes
Viscose
Yeast

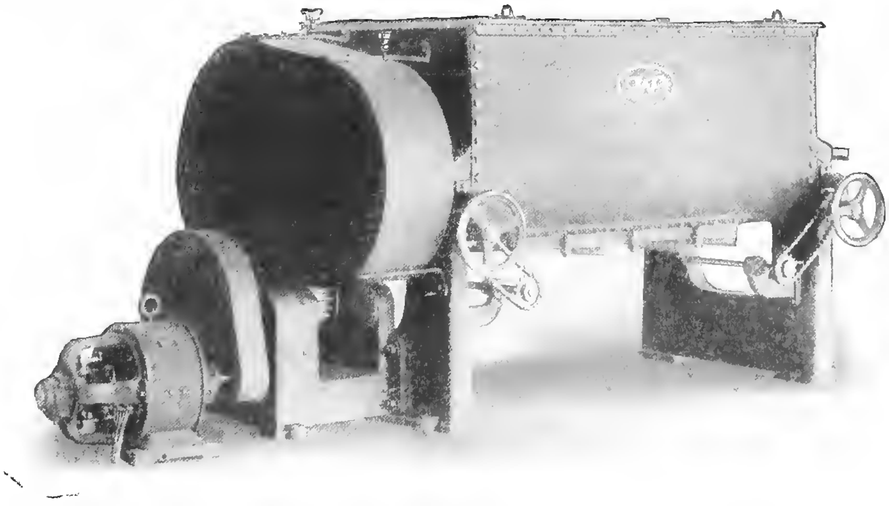


Fig. 1003
SIZE 18, TYPE X, CLASS BS, WITH COVER, MOTOR DRIVE

WHEELER CONDENSER & ENGINEERING CO.

CARTERET, NEW JERSEY

BRANCH OFFICES

New York: Singer Building.
Chicago: First National Bank Building.
Boston: 141 Milk Street.
Pittsburg: 1635 Oliver Building.
Cincinnati: 901-2 Fourth National Bank Building.
Philadelphia: 816 Commonwealth Trust Building.
St. Louis: 2207 Pine Street.
San Francisco: 40 First Street.
Denver: 1718 California Street.
St. Paul: Fourth & Wacouta Streets.
Dallas: Southwestern Life Building.
New Orleans: 1103 Hennen Building.
Atlanta: 426-7 Grant Building.
Montreal: 122 Board of Trade Building.
Birmingham: 707 Empire Building.
Charlotte, N. C.: 406 Commercial Bank Building
London: Westinghouse Building.
Yokohama: No. 42.
Rotterdam: Glashaven.
Trieste: Magazine N. 61.
Melbourne: 31 Queen Street.

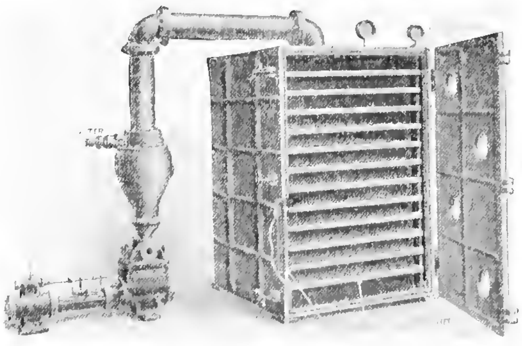
PRODUCTS: Evaporators; Dryers; Stills; Surface and Jet Condensers; Pumps; Cooling Towers; Special Castings and Machinery.

WHEELER STANDARD EVAPORATORS AND MULTIPLE EFFECTS:

These are built with vertical tube calandrias of the standard design, in single, double, triple and quadruple effects. The illustration shows a Wheeler quadruple effect being erected at our works.

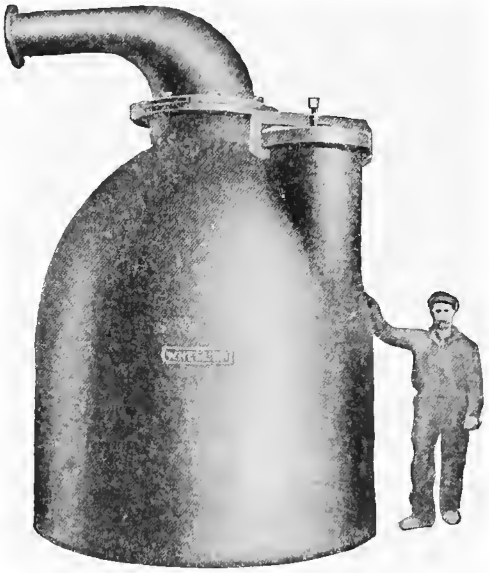
WHEELER SHELF DRYERS:

The Wheeler Shelf Dryer with a complete jet condenser is shown in the illustration. It consists of a rectangular shell, with removable steam heated shelves. These units are also supplied with surface condensers, where desired.



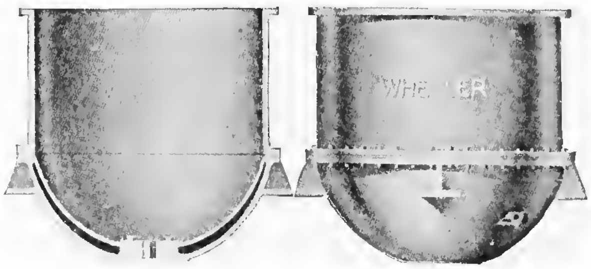
ROSIN STILLS

The accompanying illustration shows a large Rosin Still, with body cast in one piece. These stills are provided with extra heavy bottoms, built special with goose neck connections so that the opening is brought outside the furnace for pipe connections. The bottoms being cast separate, can be removed and renewed independently of the body.



SPECIAL CASTINGS FOR THE CHEMICAL TRADES:

Agitating Kettles
Jacketed Kettles
Acid Eggs
Special Castings from our own or purchasers' designs.



THE WICKES BOILER COMPANY

SAGINAW, MICH.

PRODUCTS: Wickes Vertical Water Tube Boilers and Steel Cased Boiler Settings.

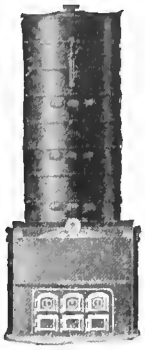
GENERAL:

Water Tube Boilers have proved their efficiency. The need is for very simple water tube boilers. The Wickes Vertical Water Tube Boiler has demonstrated its merit. First: It is constructed entirely of homogeneous material and uses straight tubes. Second: It operates with high commercial efficiency.

Two 12 x 16 inch manholes open in this boiler—one top, one bottom, inspection and cleaning is a simplified matter. Every tube can be looked through, washed or scraped.

It is easy to clean. The accessible construction of this boiler obviates physical discomfort in cleaning. Two men can open, turbine and close the Wickes Vertical Water Tube Boiler in ten hours. You know how long it takes to clean some boilers. A clean boiler promotes efficiency. A boiler easy and quick to clean is likely to be cleaned often and well—that is human nature. When your boilers—any of them—stand idle there is a considerable investment upon which you must charge interest that is not earning money—that is not contributing its share to the profit of your Company. On the contrary, it is a drag. The overhead and the unit cost of power is low when using this boiler, for it can always be in service.

High furnace temperature results from Dutch oven. Gases entirely surround and closely scrub heating surface. There is no possible chance for short-circuiting. The boiler heating surface absorbs the heat-empty pockets in setting loose heat. There are no empty pockets in this boiler. The steel cased settings are always tight, no cracked, warped, leaky, defective and unsightly settings exist with this type. A steel cased setting is a simple and sure cure for air infiltration losses. The largest preventable losses we have to contend with in boiler efficiency are excess air losses. A very long gas travel—hence long contact with heating surface is provided. Heat absorption is, therefore, assured.

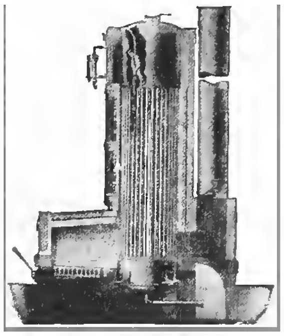


Steel Cased Setting

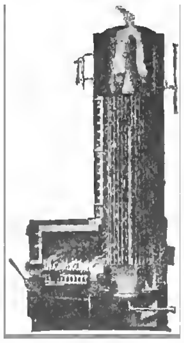
Did you ever wreck an engine by pulling water over into it from boiler? Study this boiler. The steam drum gives great height from water line to steam outlet nozzle. This height provides room for separation of the steam from the water which is entrained with it at a point close to the surface of liberation. Since the shell is subject to a mild degree of heat some superheat is effected on the steam leaving this boiler. You do not pull water over from this boiler.

The concentration of the greatest amount of power per square foot of floor space yet achieved can be attained using this boiler.

Are you interested in producing boiler horsepower hours per annum cheaply? If so, ask us for particulars.



Cut Shows Position of Man Cleaning. He Stands Erect. Is It Laborious Compared with Usual Forms?



Quick Steaming, Delivering Dry Steam

WRIGHT MANUFACTURING COMPANY

High and Low Pressure Steam Traps, Alarm Water Columns, Exhaust Heads, etc.

97-101 Woodbridge Street DETROIT, MICH.

PRODUCTS: "Emergency" High Pressure and "Victor" Low Pressure, Continual Flow Steam Traps; "Wright" Alarm Water Columns; "Cyclone" Exhaust Heads; "Wright" Strainers, Air Traps, etc.

DATA, "EMERGENCY" HIGH PRESSURE TRAPS

No. ("Emergency")	1	2	3	4	5	6	7	8
Price . . . . each	$20.50	22.50	28.00	35.00	50.00	70.00	100.00	130.00
Capacity, Lineal Feet of 1-in Pipe.	7200	9300	11400	19710	31500	50250	73050	105000
Capacity, Radiation square feet	2400	3100	3900	6570	10500	16750	24350	35065
Maximum Discharge per Hour . . . . . pounds	997	1262	1550	2625	4200	6700	9740	14026
Inlet and Outlet. . inches	½	¾	1	1¼	1½	2	2½	3
Distance through Inlet and Outlet. . . . . inches	11¼	12	12¾	13¾	15¼	16½	18	19½

"Emergency" steam traps are guaranteed on all steam pressures up to 200 pounds.

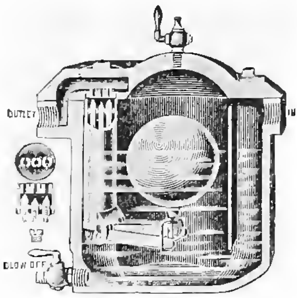
Keep the steam line automatically and continually drained of condensation regardless of small flows or floods. All "Wright" products are shipped on trial.

DATA, "VICTOR" LOW PRESSURE TRAPS

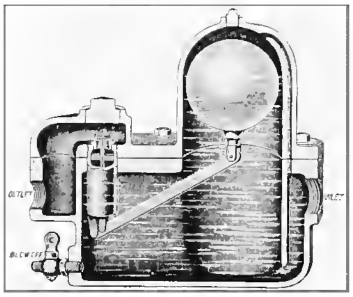
No. ("Victor")	0	1	2	3	4	5	6	7	8
Price. . . . . each	$16.50	20.50	22.50	28 00	35 00	50.00	70.00	100.00	130.00
Discharge per Hr. 3-lbs. Pressure pounds	1726	3746	6552	9988	18000	24000	30000	48250	63018
Sq. feet of Radiating Surface. . .	1432	3107	5438	8290	14040	19920	24900	40000	53050
Inlet and Outlet inches	½	½	¾	1	1¼	1½	2	2½	3
Distance through Inlet and Outlet. . . . . . . inches	9¼	12¾	14	15½	18	19½	22	23	24
Height over all inches	9¼	11¼	12½	14½	15¼	17½	20	21	22

"Victor" steam traps operate perfectly in low-presssure systems whether the steam gauge registers 0 or 20 pounds.

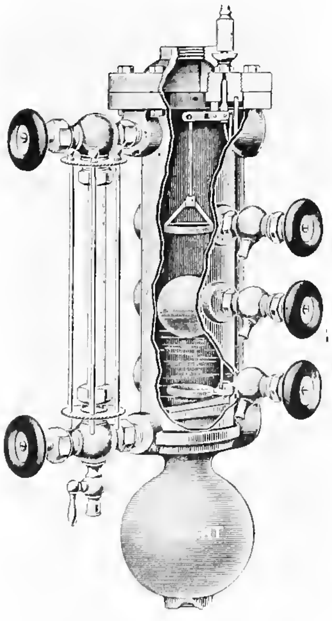
"Wright" Traps, Water Columns and other Steam Specialties are standard the world over. Let us send you illustrated Catalogue No. F30.



"EMERGENCY" HIGH PRESSURE TRAP



"VICTOR" LOW PRESSURE TRAP



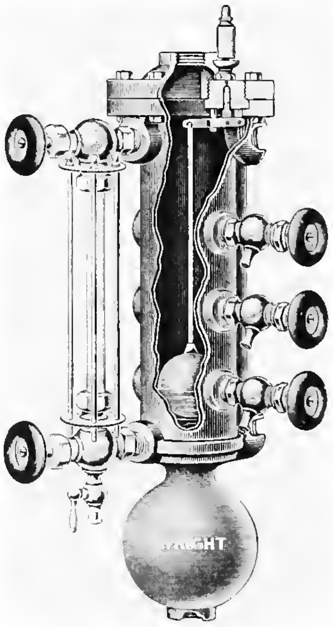
HIGH AND LOW WATER ALARM COLUMN

DATA, COMBINED HIGH AND LOW WATER ALARM COLUMNS

Size of Column	Kind and Size of Boiler	Price without Water Gauge and Gauge Cocks
1	36″ to 54″	$28.00
5	56″ to 72″	30.00
7	Water Tube	35.00
9	Others Determined by Natural Variation of Water in Boiler	40.00
11		42.50
13		45.00
15		50.00

LOW WATER ALARM COLUMNS

2	36″ to 54″	$25 00
6	56″ to 72″	28 00
8	Water Tube	35.00



LOW WATER ALARM COLUMN

AUSTIN SEPARATOR COMPANY

97-101 Woodbridge Street **DETROIT, MICH.**

PRODUCTS: "Austin" Oil and Steam Separators.

"AUSTIN" STEAM SEPARATORS.

Austin Separators are guaranteed to render the highest possible efficiency in the elimination of moisture from live steam and oil and impurities from exhaust steam.

Write for new catalog No. A25.

AUSTIN STEAM SEPARATORS

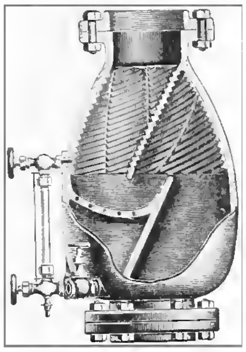


FIG. "A." Vertical

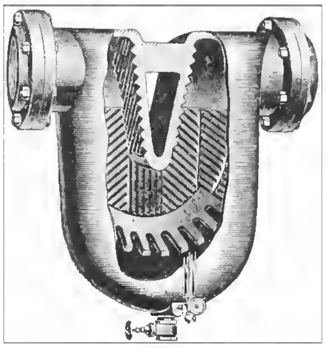


FIG. "B." Horizontal

PRICES, SIZES AND DIMENSIONS IN INCHES

Prices include connecting flanges, water gauge, nipple and straight-way valve.

Size	1½	2	2½	3	3½	4	4½
Price each	$30	$40	$45	$50	$60	$70	$75
Diameter of Flanges	Screwed	Screwed	7	7½	8½	9	9¼
Face to Face, Fig. A, Vertical	11	11	13	15¼	16¾	18	20
Face to Face, Fig. B, Horizontal	9	9	13¼	15¼	16	18¼	19¼

Size	5	6	7	8	10	12	*14
Price each	$80	$110	$125	$160	$220	$250	$300
Diameter of Flanges	10	11	12½	13½	16	19	21
Face to Face, Fig. A, Vertical	22¼	25¼	28½	31½	37	40¼	....
Face to Face, Fig. B, Horizontal	20¾	24¼	27¼	30¼	31	36	39

* Fig. "A" not made in 14-inch size.

AUSTIN RECEIVER STEAM SEPARATORS

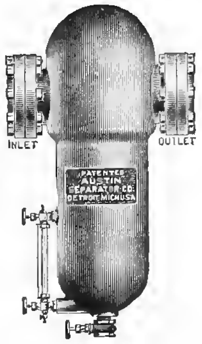


FIG. "E." Horizontal

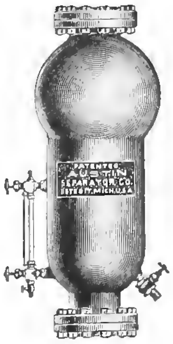

PATENTED
AUSTIN
SEPARATOR CO.
DETROIT, MICH. U.S.A.

FIG. "M." Vertical

SIZES AND DIMENSIONS IN INCHES

Prices include connecting flanges (up to 12 inch), water gauge, nipple and straight-way valve

Size	1½	2	2½	3	3½	4	4½
Diameter of Flanges		Screw Ends	7½	8¼	9	10	10½
Face to face, Fig. E		9	11	12¼	13⅜	14¾	16¼
Face to face, Fig. M	16	10	18	19¾	22½	26¼	30½

Size	5	6	7	8	10	12	14
Diameter of Flanges	11	12½	14	15	17½	20½	23
Face to face, Fig. E	19	21	22¾	24	30	34	39¾
Face to Face, Fig. M	34	37¼	42¼	48¼	58	64	70

Prices of Figs. "E" and "M" on application.

"AUSTIN" SPECIAL FIG. "S" OIL SEPARATORS.

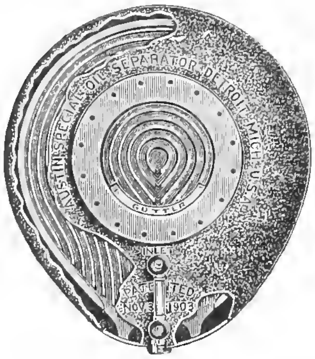

AUSTIN SPECIAL OIL SEPARATOR DETROIT MICH. U.S.
OUTLET
INLET
PATENTED NOV 3 1903

FIG. "S"

SIDE VIEW, SPECIAL OIL SEPARATOR
SELF-CLEANING

These separators are guaranteed to so thoroughly eliminate oil, grease and impurities from exhaust steam that the steam, when condensed, is entirely suitable for boiler use, ice making, steam laundries, heating systems, or any other purpose for which exhaust steam is employed.

SIZES AND DIMENSIONS, "AUSTIN" SPECIAL OIL SEPARATORS, IN INCHES

Size	Diam. of Flanges	Bolt Circle	No. of Bolts	Size of Bolts	Face to Face	Width	Height	Center of Pipe to Top	Size of Drip
1½	Screwed	....	....	....	9⅞	12	15½	6⅛	¾
2	Screwed	....	..	..	10	12⅛	15½	6 3/16	¾
3	7½	6	4	⅝	10½	15	18	7½	1
3½	8½	7	4	⅝	11	17	20	8½	1
4	9	7½	8	¾	12	19	23	9½	1
4½	9¼	7¾	8	¾	13	21	25	10½	1¼
5	10	8½	8	¾	15	23	27	11½	1¼
6	11	9½	8	¾	17	25	30	12½	1½
7	12½	10¾	8	¾	17½	27	33	13½	1½
8	13½	11¾	8	¾	18	29	36	14½	1½
10	16	14¼	12	⅞	19	32	40	16½	1½
12	19	17	12	⅞	20	34	42	17½	1½
14	21	18¾	12	1	20	36	43	18½	1½
16	23½	21¼	16	1	22	40	44	20½	1½
18	25	22¾	16	1⅛	24	42	46	21½	1½
20	27½	25	20	1⅛	26	44	49	22½	1½
22	29½	27¼	20	1¼	30	48	55	24½	2
24	32	29½	20	1¼	33	54	62	27½	2
26	34¼	31¾	24	1¼	36	58	68	29½	2
28	36½	34	28	1¼	38	64	74	32½	2½
30	38¾	36	28	1¼	40	69	80	34½	2½
32	41¾	38½	28	1½	42	74	86	37½	2½
34	43¾	40½	32	1½	44	80	93	40½	3
38	48¼	45¼	32	1⅝	44	90	105	45½	3
42	53	49½	36	1⅝	48	100	116	50½	3
46	57¼	53¾	40	1⅝	48	106	120	53½	3
48	59½	56	44	1⅝	48	112	129	56½	3

ZAREMBA COMPANY

708 D. S. Morgan Building
BUFFALO, U. S. A.

PRODUCTS: Evaporators for any Liquor; Causticizing Apparatus; Leaching and Diffusion Cells.

THE COST OF EVAPORATION:

Almost every industry that has occasion to handle liquids or solutions of any kind finds it necessary to remove more or less water from those liquids by evaporation, an operation which is oftentimes being performed at far greater expenditure for steam, labor and maintenance than should be the case. Note the sources of loss:

By using live steam where an ample supply of exhaust steam is available.

By not using the exhaust to the best advantage, so that live steam must be used in addition, whereas proper design would provide for performing all the work with exhaust.

By using a large amount of steam for heating the liquid where this work can be equally well done with the heat exhausted from the evaporator.

By heating the liquid to a much higher temperature than is necessary in well designed vacuum apparatus.

By using evaporating equipment that calls for much attention and causes high labor costs, both factors being easily reduced by using an up-to-date design.

By installing equipment that is not suited to the work, that fouls rapidly, falls off greatly in capacity, and requires too frequent cleaning.

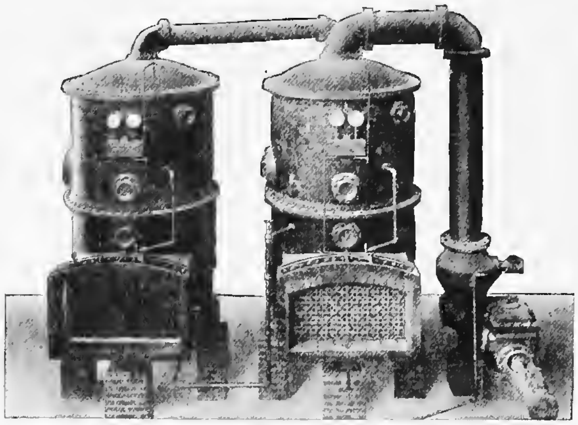
By using unnecessarily complicated apparatus having a great faculty for getting out of order, causing frequent shut-downs.

By direct loss of liquor as a result of foaming or entrainment.

By failure in the design to provide insurance against gross carelessness and the various losses that surely result.

THE ZAREMBA PATENT EVAPORATOR:

The design of the Zaremba Patent Evaporator is the result of long experience in every class of evaporator work, and provides an all-around excellence that can not otherwise be secured. The first apparatus of this type was sold in 1906 and has been doing excellent work since the day it was started.



ZAREMBA PATENT EVAPORATOR

The shell of the evaporator is cylindrical in shape and usually made of cast iron or steel; in special cases it is constructed of copper, bronze or aluminum.

The heating surface consists of seamless drawn tubing of copper, brass, steel, aluminum or lead, as the conditions may demand. Tubes are all of one length, and are secured in place by an improved type of elastic packing that is absolutely tight, and at the same time is easily taken out when tubes are to be removed. When desired, steam chests can be so arranged as to make possible a large increase in heating surface at any time by merely inserting additional tubes. This feature of the Zaremba Patent Evaporator is exceedingly valuable, especially in cases where enlargement of capacity is probable. Our apparatus can be installed having any desired margin of increased capacity. The cost of enlargement then becomes merely the cost of the extra tubes and gaskets.

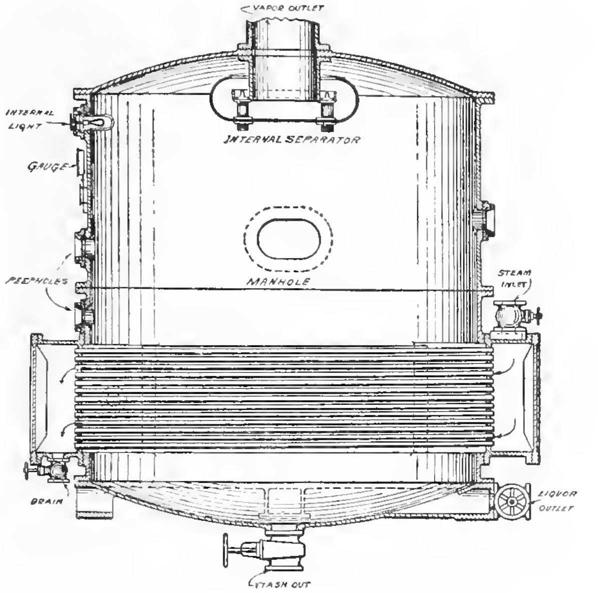
Steam circulation is from right to left (see cross section) through the tubes, which are rapidly drained of their condensation by being given ample incline. The liquor circulation is upward past the tubes and downward through large segment-shaped downtakes between the tube-nest and the sides of the evaporator.

Both steam and liquor circulation is very rapid, thus providing the conditions for maximum heat transmission through the heating surface. By the use of proper proportions the entire area of the boiling surface is kept in equal agitation, and in consequence of the vigorous liquor circulation there is maintained a strong scouring action throughout the length of the tubes, which results in an automatic cleansing of the same.

Above the tube-nest is the vapor space, which is given ample height and is so arragned that its entire

Continued on Next Page

volume is efficiently used to prevent entrainment loss. As an additional safeguard against carelessness in operation, we equip our pans with an internal separator, which returns to the boiling liquor any liquor particles that may have reached the dome of the body. Our separators are much more efficient than the old-style catch-alls and baffle-plates. The depth of the liquor necessary to proper operation is lower than in most evaporators, while the period of exposure is much reduced by the presence of the large downtakes.



CROSS SECTION ZAREMBA EVAPORATOR

To secure perfect operation the primary consideration is knowledge of what is going on inside the evaporator. We provide a complete illumination of our evaporators by the use of internal incandescent lamps, which, together with large plate glass peep-holes, make the interior of the evaporator perfectly visible and give the operator complete knowledge of its action at any time, thus affording no excuse for improper operation. These evaporators are so built that they are fool-proof and can be run by cheap labor without any danger of injury to the apparatus or loss of product.

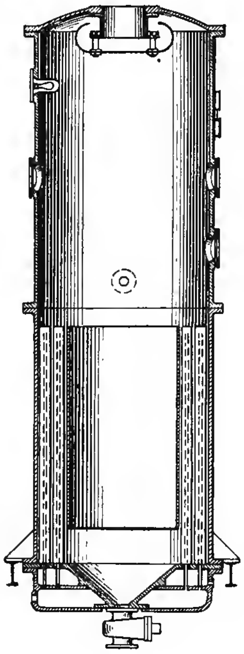
Unless otherwise specified our evaporators include condenser, pumps and all fittings necessary to make them complete and ready for operation when mounted on their supports. The item of piping includes all connections from body to body, to the condenser and to the pumps. Where a dry system condenser is used we include the leg pipe, floor stand and air line to vacuum pump. All necessary valves are furnished, including exhaust and live steam valves, also safety valves and gauges. The density of the boiling liquor is easily determined at any time by means of the liquor tester. Thermometers are provided in the case of delicate liquors.

The shell structure is ideally simple, calling for but three joints, of the flange type which is most readily kept tight. No internal bracing is required, and yet an internal pressure of 20 pounds can easily be carried with perfect safety. The bottom plates are so designed as to give the shell much settling space under the tube-nest, or no such space, as may be desired. The entire apparatus is built for hard work, long life, and no worry to its owner.

THE ZAREMBA HIGH CONCENTRATOR:

Provides means for carrying the concentration of liquids to a point far beyond the possibilities of all other evaporating apparatus. Heretofore the limit for caustic soda has been 45 to 50% solids, but by using this apparatus concentration can be continued readily to a content of 80%, solidifying on cooling.

The concentrator has a cylindrical shell about thirteen feet high, carrying its steam-chest at the bottom. The heating surface consists of tubes of cast iron or copper, connected to the steam-chest at their base and closed at the top. Steam at high pressure (100 lbs.) is supplied to their interior. The tubes are closely spaced in the annular chamber, between the shell and the wall of the large downtake. Above the heating surface ample vapor space is provided, illuminated by an internal incandescent lamp. An internal separator located opposite the vapor outlet provides an efficient guard against loss of liquor by entrainment.



ADVANTAGES:

Save cost of firing pots, also wear and tear on same.

Wear reduced to a minimum, because of low temperature used.

Save freights on finished product by reducing water content to a minimum.

Increase capacity of present evaporator by discharging its liquor at lower density.

Increase capacity of dryers in old plants.

Reduce investment in dryers in new plants.

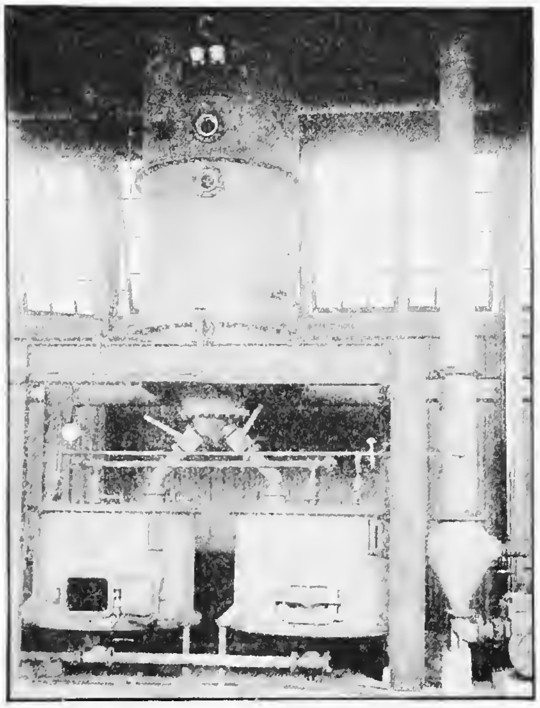
Where incineration is to take place, increase combustibility by reducing amount of water left in the liquor.

Continued on Next Page

THE ZAREMBA CRYSTALLIZING EVAPORATOR:

Is a form of apparatus especially designed for the concentration of Crystallizing Solutions and the removal of the precipitated crystals without interfering with the process of evaporation.

For solutions that tend to encrust the heating surface badly, this style of construction is best because of the vigorous circulation that continually scours the tubes and the readiness with which these tubes can be given a mechanical cleaning.



SINGLE-EFFECT CRYSTALLIZER

CONSTRUCTION:

These evaporators consist of two parts: (1) The Evaporator Body, in which the evaporation occurs; (2) the Salt Filter underneath, by means of which the precipitated crystals are separated from the concentrated liquor, washed clean and removed from the system.

The shell of the evaporator body is built of heavy cast iron or steel. Its lower portion, below the heating surface, consists of a cone into which the salt is precipitated and funnelled into the salt filter below. Mounted within the shell immediately above the cone is the cylindrical steam-chest, fitted at top and bottom with dished heads of steel into which two-inch charcoal iron tubes are expanded. Copper construction is used for corrosive liquids.

The downtake is an annular opening, of ample width, extending entirely around the steam-chest. Circulation of liquor is upward through the tubes, outward toward top of downtake, downward between steam-chest and exterior shell, then inward to lower end of tubes. This action produces a ready separation of the salt crystals from the boiling liquor, throwing them into a zone of quiet in the conical bottom and thence into the salt filter.

The filter consists of a cylindrical chamber fitted with a filter screen placed close to the bottom. At the front and immediately above the screen is a swinging door through which the separated salt is removed. The conditions inside can be observed through the sight glass. Washwater is introduced through perforated pipes mounted under the top cover of filter. Suitable vacuum and liquor pumps are connected to the system to provide for all requirements.

STEAM CHEST

All evaporators are equipped with internal separators which make impossible the carrying over of liquor by entrainment as a result of careless operation. Entrainment loss in our apparatus is thus reduced to the vanishing point.

The steam pressure used varies all the way from atmospheric to sixty pounds or more, depending on the circumstances. Ordinarily, direct-acting pumps are furnished, their exhaust being delivered to the evaporator. The condenser often can be so located as to draw its own water by suction.

THE RAPID CIRCULATION EVAPORATOR:

Operates on the film system, and is designed for the concentration of liquids that tend to foam badly; for liquids demanding frequent mechanical cleaning of the tubes; for liquids that must be concentrated with minimum exposure to heat.

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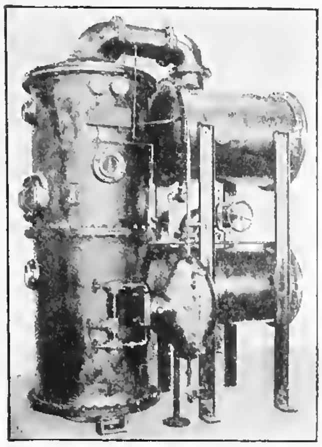


RAPID CIRCULATION EVAPORATOR

The illustration shows a Single Effect Water Stil with surface condenser, used for the manufacture of distilled-water ice. Any number of effects can be used.

The heating surface is carried in the lower projecting chamber, consisting of horizontal tubes. Steam is outside the tubes, boiling liquid and vapor inside. The evaporator body provides a large vapor space and is fitted with internal separator, internal electric light and peepholes. Operation is practically automatic, due to the use of a highly efficient liquor-level regulator.

ADVANTAGES:

Amount of liquid exposed to heating surface reduced to minimum.

Boiling surface is eliminated (all boiling occurs within the tubes).

Loss by foaming or entrainment is impossible.

All tubes accessible for cleaning by removing steam-chest cover.

Construction of utmost simplicity; no repairs as in other film-type apparatus.

Design exceedingly compact, requiring little space.

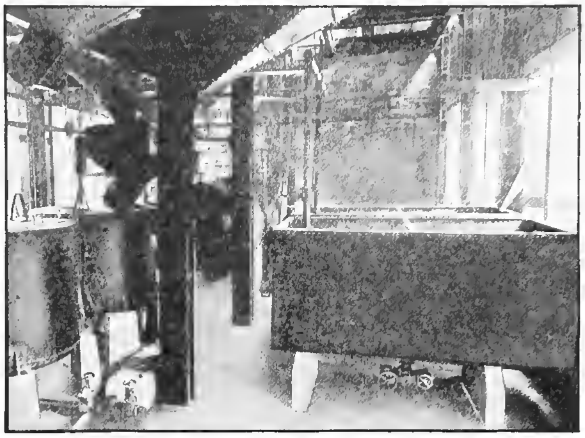
ACID-PROOF LININGS:

Our system of acid-proof linings applied to iron and steel evaporator bodies has proved itself to be a valuable and successful innovation. By its use the cost of apparatus for concentrating liquors in an acid condition is greatly reduced.

No difficulty is experienced in maintaining the linings intact—the method of construction is such that the lining must "stay put."

CONTINUOUS CAUSTICIZING APPARATUS:

For the manufacture of caustic soda from soda ash, and for the recovery and causticization of waste carbonate liquids produced in the soda pulp, mercerizing, rubber, aluminum, and other industries. Liquids causticized under pressure and settled in one continuous operation. The work effectively is performed at densities up to 20° Be., thus greatly reducing the amount of subsequent evaporation.



CONTINUOUS CAUSTICIZING APPARATUS

The process is simple and is conducted with low labor cost. Exhaust steam is used for causticizing without dilution of liquor.

Illustration shows causticizing equipment having daily capacity for handling 100,000 gallons of waste liquor produced in the mercerizing industry.

For small-scale operations we furnish causticizers arranged for working in batches.

LEACHING CELLS AND DIFFUSION BATTERIES:

With side or bottom discharge, for the extraction of soluble materials.

MANUFACTURING FACILITIES:

The success of Zaremba Company is in part due to the excellence of mechanical execution of its output. All our apparatus is built in thoroughly equipped shops prepared to handle work of the largest size. The high grade of castings that we furnish is a matter of continual remark.

In addition to cast iron and steel construction we do large amount of copper work.